IAVE

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

the growing and challenging world of the industrial designer

(see page 42)

- Credo for a Renaissance in Industrial Arts, Perry
- Die Stamping in the School Shop, Gerber
- Report on the AIAA Convention

June, 1960

A COMPLETE LINE *of fine products for drafting and engineering students is made at the* POST *plant in Owen, Wisconsin. This includes drawing boards, T-squares, scales, precision triangles, curves and many others.*

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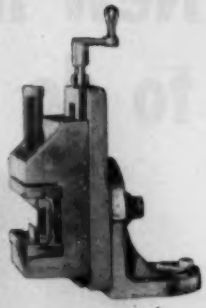

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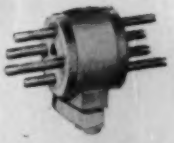

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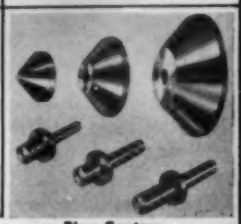

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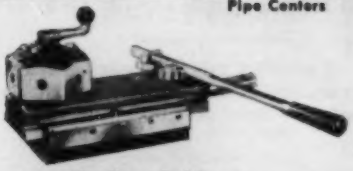

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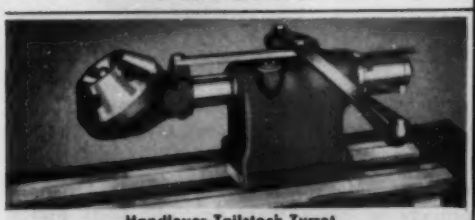

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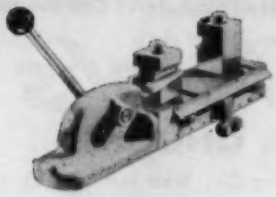

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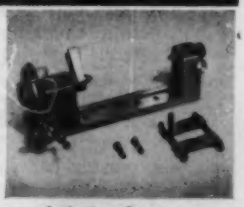

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THE WORLD'S MOST MODERN COLLET CHUCK

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  The 10 Rubber-Flex collets in the 500 Series, developed especially for use with Model 50, cover a greater bar stock range than 63 old-fashioned steel collets. You can chuck any bar between 3/32" and 1-1/16" with this set of 10 collets.
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- **Adapters**
  Model 50 adapters are fully machined for immediate mounting. Available in all popular threads and American Standard L00 taper.
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IA / VE

Vol. 49, No. 6 / June, 1960

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William C. Bruce

Editorial Director
Robert C. Bruce

Associate Editor
Edward J. Pollock

Assistant Editors
Helen Graf, Barbara Collins

Art Director
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Circulation Manager
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Advertising Sales

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THE EDITOR'S STAND

Let's Take the Offensive! 13
How to "sell" industrial arts on its unique contributions.

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Articles Indexed. — The Articles contained in the Magazine are indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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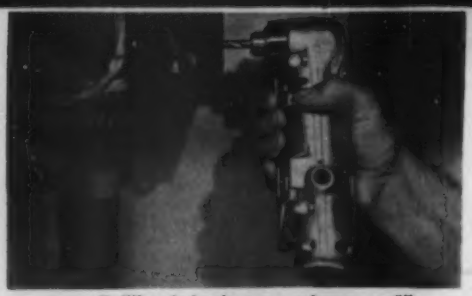

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Adjusts to thousandths . . . just a simple turn of the barrel gives you micrometer accuracy.

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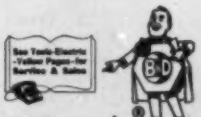

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how do you vote?

In an attempt to provide more helpful material for your use, we have presented six special columns in your IA/VE from January through June. If you would like to see some of these continue as monthly features, please let us know!

The "trial" columns included:

- ☐ 1. **What's His Line?** — with information on occupations. (Page 4 of your IA/VE for January.)
- ☐ 2. **What Does Research Say?** — with facts presented by research in industrial education. (Page 4 of your IA/VE for February.)
- ☐ 3. **Then and Now** — changing attitudes toward vital industrial education issues. (Page 6 of your IA/VE for March.)
- ☐ 4. **Interesting People: The Heritage of Industrial Arts** — how inventors contributed toward developing today's i-a tools or materials or processes. (Page 4 of your IA/VE for April.)
- ☐ 5. **What Do You Think?** — both sides of a key issue in industrial education. (Page 4 of your IA/VE for May.)
- ☐ 6. **Tips for Teachers** — techniques for better teaching. (Page 6 of your IA/VE for June.)

Why not review each of these and let us have your reactions. Do you believe columns developing along any of these lines would be effective reading for you?

tips for teachers / techniques for better teaching

YEAR-END CLOSING OF THE SHOP

1. **Recondition the tools:**
   Grind plane irons, chisels, and other edge-cutting tools.
   Sharpen other tools like center punches.
   Replace broken handles.
   Remove rust spots.
   Cover metal surfaces with rust preventative.
   When necessary, store tools and special equipment in boxes.
2. **Clean and protect the power machines:**
   Remove blades, saws, and grinding wheels.
   Clean machines and oil parts.
   Cover table surfaces with oil or a no-rust product (try the spray-on kind).
3. **Clean out lockers, project storage rooms, finishing rooms, etc.**
   Dispose of partly completed projects.
   Remove aprons, goggles and other personal items from students' lockers.
   Clean brushes and other finishing equipment.
   Get rid of acids and open cans of inflammable substances.
   Throw away used rags, old papers, bits of material and other junk items.
4. **Rearrange storage of materials:**
   Group materials as to kind — lumber, metal, screws, etc.
   Check on needs for next year.
5. **Check inventory and file a report:**
   Make an inventory check of machines, tools, and supplies.
   Report lost, stolen, and obsolete items to principal and/or supervisor.
6. **Prepare requisitions:**
   Order machinery that is in the budget.
   Request hand tools and supplies.
   Check on replacement parts.
   Request equipment repairs.
7. **Make out grades and records:**
   Complete student grades and written reports.
   Make department reports.
8. **Submit an annual report to your principal and supervisor:**
   List accomplishments.
   Ask for changes in layout and equipment.
   Suggest better curriculum and class arrangements.
   Report on your shop plans for next year.
9. **Remember the details:**
   Take care of textbooks.
   Return library books.
   Turn in shop keys.
   Fill out summer address.
10. **Did we forget something? Jot it down:**
    .....
    .....
11. **Is the shop checked out:**
    Fire Hazards — Oil, rags, and inflammable materials taken care of.
    Neatness — Everything clean and well arranged.
    Rust Prevention — Water leaks, acid fumes, surface protection checked.
    Security — Water, gas, air, and electricity turned off. All cabinets, windows, and doors locked.

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New finisher for school shops

Doubles as a tool sharpener

4" Belt and 12" Disc Finishing Machine—available with wood or metal dust collector.

You can teach 95% of all finishing operations with this new Delta Belt and Disc Finishing Machine—and practically *eliminate* "burning" when your students sharpen tools. With an *exclusive* new Delta attachment students can sharpen wood chisels, plane blades, many carving tools—quickly and precisely, yet with complete safety. Attachment holds tool at correct angle and a knurled nut provides hairline adjustment for amount of "cut."

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inventors and industrial arts

Your article about Eli Whitney (see pg. 4 of your IA/VE for April) is not only interesting but can be put to good use.

Because most texts say so little about the impact of Mr. Whitney's developments on modern industrial production, I have distributed copies to the teachers of American History at Harding High School and have suggested that the vocational students in their classes might find the IA/VE article an interesting reference.

In response to your specific question I believe that a monthly discussion of how an inventor contributed to today's tools, or materials, or processes would be most helpful provided it was made applicable to trade and industrial education as well as to industrial arts.

W. K. Dunton, director of vocational and industrial education, Warren Ohio, Schools

more on Dr. Conant

Your February issue of IA/VE was like manna from heaven.

I have particular reference to the report by Dr. Rudiger (see pp. 14–16) on "Industrial Education and the Conant Study" as well as "The AVA in Chicago."

Ever since Sputnik, math and science have almost blinded the eyes of certain administrators and other people to the extent that they just about lost sight of the place and purpose of industrial arts and vocational education. I am happy to see the remarks that Dr. Conant later made in this regard.

I am wondering if this is not a propitious time to bring these facts of Dr. Conant's remarks to the attention of school officials and the public in general.

I for one am planning to summarize these articles and present it to my administrators.

Carl J. Vollberg, head of the industrial arts department, Franklin Area Joint School System, Murrysville, Pa.

for a review of changing i-e attitudes

I especially want to comment on the page, "Then and Now" in the March issue (see p. 6). It takes something like this to make us stop and attempt to find out exactly where we are going and where we have been. It seems that too often we in industrial education outline high-sounding objectives and immediately forget them and continue to teach as we were taught or take the easiest road available, that of "holding shop." I do think we should take a long hard look at the entire field of industrial education and select those objectives to which we can make the greatest contribution and stop trying to teach everything in the school curriculum. By setting our sights on the most important objectives for which there is a possibility of attaining we will, I hope, help to bring the industrial arts and trade and industrial phases of industrial education closer together.

Carl R. Bartel, assistant professor, industrial education, Utah State University, Logan

industrial arts: hard education

In answer to a four-point program outlined in *Industrial Arts: Hard or Soft Education?* (see pg. 13 of your IA/VE for February), a survey was conducted by William T. Kelly, assistant director of vocational and secondary industrial arts in Philadelphia, Pa., as a step to make industrial arts "hard education."

Approximately half of the district's 343 industrial arts teachers, who responded to the survey, believed:

1. *What is industrial arts?* — 153 gave definition from "Industrial Arts, Its Interpretation in American Schools," Bulletin 1937, U. S. Dept. of Interior Office of Education, No. 34, 1938, pg. 1; 5, exploration; 4, experiences in skills and tool manipulation, etc.

2. *What should the subject matter areas of industrial arts be?* — 87, drafting; 80, electricity; 80, woodworking; 77, metalwork; 59, graphic arts; etc.

3. *What should be the standards for each subject-matter area at each age-grade level?* — 104, developing individual to highest possible level of attainment; 38, standards in keeping with aims and objectives; etc.

4. *What methods and techniques of teaching should be used?* — 125, variety; 20, textbooks; 15, demonstration; 11, project.

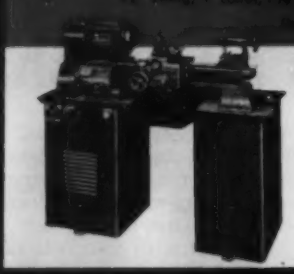
5. *Are there basic concepts, understanding, applications, information, skills, attitudes, and appreciations in the area of industrial arts that are good for all?* — 148, yes; 3, no.

new safety feature

Logan

Automatic Safety Gear now standard equipment on 10" and 11" models

12" Lathe



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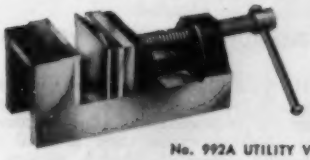

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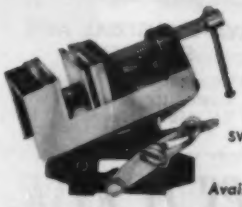
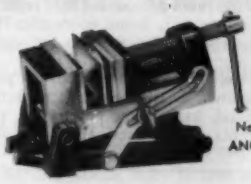


No. 4992A SWIVEL-TILT VISE



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Can be adjusted to full 90 degrees or lowered and used as ordinary vise when horizontal. Accurate graduations indicate angle. And angle is quickly set and locked in position with thumb screw. All parts machined of high quality materials.

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(For more information from advertisers, use the postcard on page 57)

the bulletin board / news notes and trends in industrial education

PARENTS DEFEND INDUSTRIAL ARTS

The Milwaukee, Wis., school board deferred until fall of 1961 the junior high school curriculum recommendations of superintendent Harold S. Vincent to add foreign language electives and an optional remedial instruction course by reducing time for music, art, home economics, and industrial arts in the seventh or eighth grades.

When the above reorganization plans became known, board members said they had received letters and telephone calls from parents who feared the curriculum revamping would not serve the needs of many pupils. One director said that "some parents feared that increasing the academic offerings in the junior high school would gear the school program more for pupils who went on to college and not serve adequately the needs of the 80 per cent who did not go to college."

AVA INDUSTRIAL ARTS STATEMENT

The AVA Industrial Arts Policy and Planning Committee has announced a revision of its 1956 statement of "Industrial Arts in Education." The pamphlet, developed by the group's editorial committee (Dr. G. Harold Silvius, chairman), presents a definition of industrial arts, its unique contributions, what the basic areas (drafting, electricity and electronics, graphic arts, crafts, metal, power, and wood) should include, and place and purpose emphasis by levels. The publication is available (5 cents per copy; 4 cents for 2 to 100 copies; 3 cents for 101 or more copies) from the American Vocational Association, Inc., 1010 Vermont Avenue, N.W., Washington 5, D. C., according to Dr. John A. Jarvis, AVA vice-president for industrial arts education.

PHILADELPHIA LARGE VOC–ED EXPENDITURE

The Philadelphia, Pa., school board has allocated $90,000 of its $1.8 million federal grant for vocational education equipment. The allocation ranks third in total expenditure among 15 separate projects in curriculum and equipment of the bulk of the grant.

T & I PROGRAM FOR GIRLS

"Trade and Industrial Education for Girls and Women" is the title of a new Office of Education directory of occupational training courses for girls and women throughout the country during 1958–59. The book, based on a survey conducted by the OE trade and industrial education branch, is designed to assist administrators, counselors, and teachers.

STEVENS INSTITUTE GRANT

A $1.25 million gift has been made to the Stevens Institute of Technology by Mr. and Mrs. Eugene McDermott of Dallas, Tex. The school, located in Hoboken, N. J., has announced that it will use the money — given "to lend support to an institution which has contributed significantly to the advancement of technology" — to help construct a 13-story "Stevens Center," a service and recreational building.

PLANS FOR T & I CONFERENCE

The 1960 National Leadership Development Conference for Trade and Industrial Education will be held August 8 to 19 at Stout State College, Menomonie, Wis., according to John P. Walsh, director of the OE trade and industrial education branch.

Emphasis of the 1960 conference will be on development of leadership qualities and competencies in teacher educating and in development and use of appropriate curricular materials.

CONNECTICUT I.A. ASSOCIATION CONFERENCE

The Connecticut Industrial Arts Association held its 27th Annual Spring Conference at Central Connecticut State College, New Britain, on May 6 and 7, 1960.

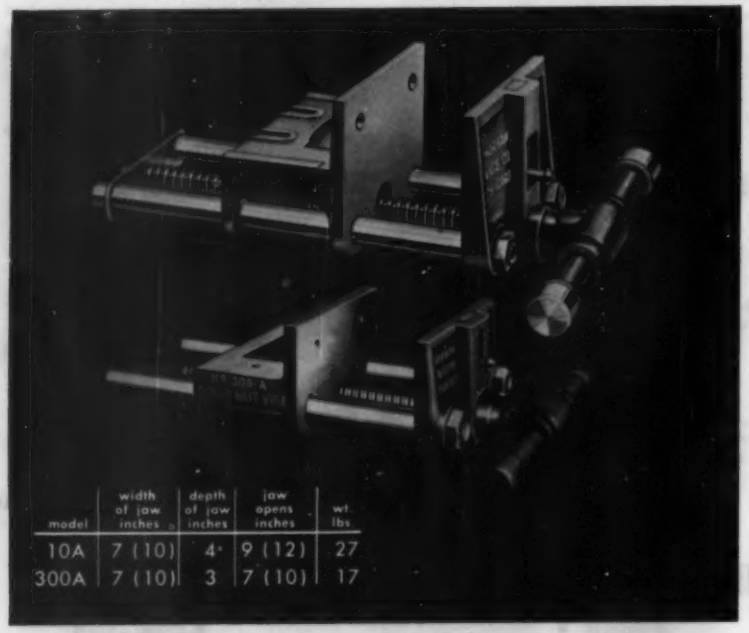
Highlights of the conference included panel discussions, the annual Student Craftsman's Fair, and the Friday night banquet at which William R. Mason, supervisor of industrial arts, Cleveland, Ohio, was the speaker. His address was entitled "Why Unique Contributions?"

COMING CONVENTIONS

June 13–17. Colorado Vocational Association, at Colorado State University, Fort Collins, Colo. Exhibit Chairman, Herbert L. Benson, Colorado State University, Fort Collins, Colo.

July 5–8. Pelican State Vocational Association, at Southern University and A & M College, Baton Rouge, La. Secretary, C. H. Chapman, P.O. Box 9968, Southern Branch, Baton Rouge, La.

TWINS IN DESIGN.... TOPS IN EASE....



model	width of jaw inches	depth of jaw inches	jaw opens inches	wt. lbs.
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300A	7 (10)	3	7 (10)	17

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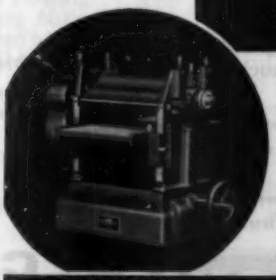

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Industrial Education Department
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● **All gears and shafts travel in a bath of oil.**

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● **Tapered key-lock spindle nose** . . . eliminates danger of chuck run-off on braking or reversing.

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Motor recommended	1 or 1-½HP, 1 or 2 speed

Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.

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LET'S TAKE THE OFFENSIVE!

History has proved that wars are never won by defensive action. The Maginot-line kind of thinking is disastrous to nations and is equally fatal to an idea or an educational program. It is said that we can never retain "status quo." We must either go forward or we fall behind.

In reading current industrial arts literature, one gets the feeling that industrial arts is on the defensive. We seem to be trying to hold on to what we have and to be protecting it from the inroads of academic subjects. When some of our academic educators write that industrial arts need not be a daily subject activity in the junior high school, we run for cover. We try to decide how we can protect what we have. Often our attitude is "half a loaf is better than none." If they (meaning the educators) want to cut industrial arts time one or two periods per week, well, some of us think "Maybe we can't do anything about it." If we accept this kind of thinking, then it's time for us to "throw in the sponge," abdicate from our present position, and allot our time to some other area of education!

If our only justification for industrial arts is that it teaches boys to "adjust" to life by a method of teaching which centers on a happy sense of "getting along" together in the great adventure of "democratic living" and daily "problem solving," then let's hand over our time to progressive "core" teachers! Certainly, they feel they can do a better job of this "making every child a well adjusted citizen" than we can!

If industrial arts can't offer something that is *distinct, different, important,* and *significant* to the education of every boy, then indeed we are a failure. We cannot afford to follow like sheep the educational philosophy and jargon of the so-called intellectual "educators." We must have a program that makes sense to the students, parents, administrators, business, and professional men, and *most of all,* to ourselves. Our major objectives must make *distinct* contribution to general education. **We shouldn't stress the same general objectives that could be applied equally well to social studies, physical education, home economics, art, or any other subject areas.** And it doesn't make much sense to say that we do a better job with these objectives than do the other subject areas. It's not enough to say that we can teach co-operation, leadership, self-reliance, etc., better than social studies can, for example.

Industrial arts can be a *distinctive* part of every boy's education. It can contribute something that he can't learn in any other area. What are some of the things that only industrial arts can do?

1. **It can teach the student to use and think with tools and machines.** Someone has said that the important things to learn in life are "to work and to think." Everyone someday has to earn a living by working, as we must all learn to think. Let's remember that without tools we not only wouldn't have such things as cars and planes, but we wouldn't have "culture." What would be the student's chances of reading Shakespeare without the invention and operation of the printing press?

2. **It can teach him to read and use two kinds of languages, the technical language of industry and the language of drawing.**

3. **It can teach him about the basic materials of industry:** where they come from, how they are processed, how they are shaped and worked. This we do by actually using the materials — not the vicarious kind of learning that comes from writing a theme on the story of aluminum, for instance.

4. **It can teach him about the occupational opportunities in the many areas of our industrial economy.** Students can really explore their own interests and aptitudes.

Surely *you* can add more distinct contributions. The point to remember, however, is this: *these are important "learnings" that only industrial arts can give.*

Let's let the other areas of education fight about such general objectives as co-operation, self-reliance, leadership, etc., while we sell our program on its distinct merits. Certainly we contribute to these fine objectives as does all of education. The people who are important to us will "buy" this kind of teaching.

Remember:

1. The *first interest* of all boys at both junior and senior high school level is not girls or cars or sports but "what will I do for a living."

2. Research indicates that there should be *more* — not less — industrial arts at the high school level.

3. Administrators want a program that *fits the needs* of all of their students and industrial arts is a vital need of all boys.

4. Intelligent business and professional men agree that education which introduces students to the world of industry and business is an essential part of every school system.

5. Industrial arts teachers can see the sense and feel the satisfaction of teaching something that is *concrete, specific,* and *measurable.*

Do *you* agree?

John L. Feirer

Credo for a Renaissance

- **"Believing in ourselves"** is a key step toward upgrading industrial arts programs and selling them to "our public": boards, administrators, parents, students, etc.
- This positive approach hammers away at **basic beliefs, how to build self-confidence,** etc., **spotlighting major misconceptions** of others toward our field and what we must do to correct them.

Why is it that today's critic looks upon industrial arts only as a developer of technical skills and in no sense is to be considered as an intellectual discipline?[1] Why is it that industrial arts is thought of only as a *doing,* rather than a *knowing* field?[2] Why is our field seen only as a producer of "things," rather than a developer of the intellect? Can it be that we, as teachers in the area of industrial arts, are in a large measure to blame for the confused thinking that currently obtains? Can it be that we have only done a small part of the massive job of educating our public?

Principles of Industrial Arts

Before we can discuss how we must attempt this, we must agree on basic beliefs on industrial arts:

1. Industrial arts is an essential part of what is called the general education of all youth, both boys and girls. Though it may have prevocational and vocational relationships, as it also has a relationship to leisure, it is essentially a subject that takes its place alongside the sciences, history, and humanities as part of what is called liberal education. It is cultural in the true sense of that term.

2. Industrial arts is a discipline, potentially as great a developer of the mind as other areas of study designated as disciplines.

3. Industrial arts has a natural relationship to other subject matter fields, and they to it. It is impossible to think of any indvidual field as *pure,* an entity, standing alone unto itself. We are not in competition with other areas of study; all are important. And of all the teachers in a school the industrial arts instructor *has* to have the broadest of backgrounds if he is to function effectively.

4. The industrial arts *teacher* is the key to effective i-a learning. A good teacher can make *any* subject live. And to make it live, that good teacher draws freely upon many other branches of knowledge in order to develop understanding on the part of the learner. A good teacher knows he can't *give* a student an education, but he can *stimulate* that person to *get* one for himself.

5. Along with a good teacher we in industrial arts need *time* to get the job done. We know that the goals of industrial arts cannot be achieved in a single class period five days a week. That is hardly enough time for the essential laboratory part of our work, and so we must supplement our lessons with workbooks and homework. That is not done to gain academic status and respectability, but rather it is required in order to get a *whole* job done.

A discipline lays a solid basic core of factual material, and it requires the memorization of terms, laws, principles, formulas, etc. It poses problematic situations and stimulates a student to reason his way to answers. All of these essentials are latent in the industrial arts. If it *is* status we seek, all we need to do is to roll up our sleeves and go to work. The elements of a discipline are at our finger tips waiting to be used.

Building Self-Confidence

However, before we can ask others to believe in us and our field, we must first believe in ourselves. We must be possessed of a sound philosophy of industrial arts and fully understand the part it *can* play in the pattern of general education for all. If it is to achieve its full potential, we must see it as a discipline by understanding what a discipline really is and what it is supposed to do. We must have sound objectives that will stand the closest examination, and formulate teaching methods that will permit their development. We must listen to *sincere* critics and examine their criticism for such value as it may have for us. We must want to be *right.* If we're off base, we want to correct our error. If the criticism pointed at our field is not sound, and not grounded in fact, then we have the obligation to *answer* our critic in a dignified, professional manner, hoping that we can arrive at a common understanding because it is *lack of understanding* that is the root of confused thinking today. We want to work in such a way that we can *command,* rather than have to *demand,* respect for the field of industrial arts and the part it plays in life today.

How do we go about believing in ourselves? How do we achieve con-

[1]Arthur E. Bestor, *Educational Wasteland* (Urbana, Ill.: The University of Illinois Press, 1953), p. 73.

[2]James B. Conant, *The American High School Today* (New York: McGraw-Hill Book Co., 1959), p. 27.

in Industrial Arts

KENNETH F. PERRY

fidence in ourselves, and develop pride in the field we represent? The answer is relatively simple, yet it involves much hard work. We must read everything that has a relationship to my problem — books, magazine articles, newspapers, reports, etc. We must seize upon every opportunity to profit from discussions with our fellow teachers and to learn what they may be trying out that may have a bearing on one of our own problems. We should make ourselves sensitive to problems related to our field; we should accept the invitation to present them to colleagues in the weekly teachers meeting, looking upon that opportunity as a time when understanding can be developed rather than regarding it as an assignment to be undertaken with displeasure. We must be familiar with the results of existing research and the implications it has for our field, and we should be bubbling over with suggestions for further study that will point the way to more effective teaching techniques.

A Positive Approach

As we examine ourselves let us take a positive approach. As has already been said three times, we look upon our field, industrial arts, as a discipline. A disciplinary subject or organization of knowledge is valued chiefly for real or presumed use in "strengthening" the mind or one of the attributes of the mind such as reason, memory, or the ability to work abstractly.[3] A student after being subjected to the disciplinary areas of study is presumed to have developed his ability to think. This assumes that a series of courses designated as disciplines, grouped in a program referred to as liberal arts, provides the foundation, groundwork, and "stuff" of thinking. It is the opposite of the point of view expressed in the following quotation:

> Besides vocational training in the specialized sense, there are many kinds of practical training, non-intellectual in character which a school or college may nevertheless properly offer as complements to its central program of liberal education. Home economics, shop work, typewriting and bookkeeping represent skills of such general value that no student is likely to find them inapplicable to the life he eventually leads. They remain technical skills, not intellectual disciplines, but if they are clearly recognized as such and are not permitted to become substitutes for training in the ability to think, no valid reason can be given why the school or college should not offer supplementary instruction in them.[4]

As the preceding paragraph indicates, industrial arts is *presumed* by some to develop only *technical skills*, while in a discipline a student wrestles with abstract problems and works his way through problematic situations. He memorizes salient facts and adds to his storehouse of knowledge. By drawing upon this academic storehouse and by weighing values, he learns to reason and by repeated class exercises strengthens that power. Now note some of the key ingredients in a discipline: memorization of facts, formulas, and principles; the posing of problematic situations requiring a student to draw upon that background as he reasons his way to an answer. Can the area of study called industrial arts meet the requirements of a discipline? To

— West Chester, Pa., Schools

[3]Carter V. Good, editor, *Dictionary of Education* (New York: McGraw-Hill Book Co., 1945), p. 396.

[4]Arthur E. Bestor, *Educational Wastelands* (Urbana, Ill.: The University of Illinois Press, 1953), pp. 72–73.

Dr. Perry is chairman, division of the arts, Colorado State College, Greeley.

the author the answer is obvious — *yes!*

Many of us attempt in our teaching to lay a solid groundwork of basic material. The very nature of our work requires the memorization and understanding of laws, principles, and formulas. After laying a groundwork of skill and knowledge we stimulate original thinking where problematic situations are posed and a generous amount of reasoning is required. The English composition class works in exactly the same way as instruction culminates in a "theme." The students' "exhibit" in the science fair is a similar outcome. Each area of instruction properly presented, lays basic groundwork and seeks assignments that will stimulate a student to pursue original, independent work in order to "set" the lessons of the course. Why is it then that our critics see us *only* as makers of breadboards, tie racks, and bookends? Can it be that that *is* all we have done in some instances? We realize that there is poor teaching in other areas of instruction too, but that is no excuse for us to do a poor piece of work.

For a moment let us turn to some of the objectives inherent in our work.

basic beliefs: industrial arts is an essential part of general education; it is a discipline; it is related to other subject matter fields; it demands a good teacher; it requires time for an effective job . . .

— Allen Finley, Oakland Tribune

A Place for Skill

Our critics see us *only* as craftsmen, teaching only the *skills* of our subject, and in some instances perhaps that criticism may be merited. But skills are *required* in the manipulation of a material medium just as they are fundamental in English literature, the study of languages, trigonometry and the calculus. Skill and knowledge are two ingredients basic to creative thinking. At the same time that educational critics *deplore* the poor teaching of fundamental skills in their own academic areas, they criticize us for the effort we make toward that end.

Perhaps they see us as *only* teaching skills. Similar effort in mathematics would make unnecessary the need for the hundreds of extra accountants in the treasury department after our April 15 reports are filed. Similar effort in English would eliminate some of our poor spellers and the need for remedial courses on the graduate level of college. No, we must never apologize for making every effort to lay a groundwork of skills — mastery of the medium. But that is only a small part of our job.

Our philosophy recognizes that industrial arts is a part of the general education of all youth, boys *and* girls. To fulfill that challenge we are charged with imparting all the knowledge that can be crammed into the time at our disposal. Teaching those lessons and developing the required skills cannot be done in the allocated class time, so we'll originate a workbook and have homework.

> If a school is organized with a sufficient number of periods in a day, there is no difficulty in having the programs of the academically talented include as many as four years of art, music, and other electives, as well as five subjects with homework in each of the four years (twenty academic subjects with homework.)[5]

On Knowledge

Our homework won't be required in an effort to gain academic status of respectability. It will come only because we cannot get a whole job done — achieve the goals we set for my subject — in 50 minutes a day. In teaching the skills of our field together with its related lessons of factual material (knowledge) we are laying the groundwork that will make possible original thinking in an area where materials, problems of line, color, and design are considered; where outcomes are reflected in everything we live in, cook with, eat from, wear, ride in and use. (Add "fight with" to that list, it seems to be receiving emphasis right now.)

The original "products" of the humanities may be the novel, the short story or the poem — but they are recorded on paper and housed between covers created and designed in our area. The original score of the composer in the field of music is likewise set down on paper, and later transformed into tone on an instrument designed and fabricated by an industrial artist. Science works with ideas which when combined with the creative ability of the artist-technician-craftsman becomes a guided missile. If man ever gets to the moon it will be by means of a "thing," produced of material, incorporating the best thinking in *many* fields including physiology. (Or wasn't physical fitness one of the requirements when candidates for the trip to outer space were selected?)

On Preparation

The teacher of industrial arts faces the challenge of having to be the best prepared instructor in a school. In addition to possessing ability peculiar to the several areas of his own field, he must also have a background of knowledge in many other branches of study. To teach adequately he must know more than a little about chemistry, physics, botany, and mathematics. As a teacher he is *expected* to be able to speak and write well. Correcting the papers he requires, makes mandatory a command of the fundamentals of English, and if his work includes the graphic arts, *this* responsibility is multiplied. Adequate presentation of lessons relating to the industrial arts will cause him to dip more than a little bit into geography, economics, and sociology. His opportunities to guide and counsel are endless. He must know the psychology of the gifted as well as the problems of the slow learner.

On Workshops

In all our workshops we must have *in*struction and *con*struction, if we are to achieve our goals. *In*struction lays the basic groundwork, presents the principles and laws, teaches the formulas, and imparts the information that leads to understanding. *Con*struction is the laboratory part of the experience that sets and tests the lessons learned.

In this sense we are paralleling the method of teaching in chemistry, physics, botany, and zoology — formal class presentations followed by work in the laboratory with materials

(Concluded on page 50)

[5]James B. Conant, *The American High School Today* (New York: McGraw-Hill Book Co., 1959), p. 27.

Selecting I-A Solids From Industry

TROYCE D. McGOVERN

▶ Industrial arts, representing industry, should have "solids" in subject matter selected for their relation to our "leading industries."

▶ Here is a discussion of five solids representing our most important industries.

In selecting the industrial-arts "solids" it is first necessary to examine the philosophy of industrial arts. Industrial arts is that phase of education which is designed to represent industry — its organization, tools, materials, occupations, processes, and technological nature of our society.

Almost half the high school graduates, both men and women enter trade and service occupations upon leaving school. Therefore, our schools have placed increased emphasis on preparation of youth to take their place in an industrial society upon the completion of their education. A major part of this preparation consists of giving an understanding and knowledge of industry.

The industrial-arts program when accomplishing the following recognized objectives, will fulfill this philosophy:

1. To explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products and occupations.
2. To develop recreational and avocational activity in the area of constructive work.
3. To increase an appreciation for good craftsmanship and design, both in the products of modern industry and in the artifacts from the material cultures of the past.
4. To increase consumer knowledge to a point where students can select, buy, use, and maintain the products of industry.
5. To provide information about and experiences in the basic processes of leading industries in order that students may be more competent to choose a vocation.
6. To encourage creative expression in terms of industrial materials.
7. To develop a certain amount of skill in a number of basic industrial processes.

The content or subject matter of industrial arts must be selected to provide for the realization of these objectives. When selecting "solids" to be taught in the industrial-arts curriculum, the objectives of industrial arts — representing industry — must be kept in mind. Therefore, it is only logical that industries should be selected representing the greatest number of employees and the largest assets.

The ten industries in the United States employing the largest number of people in 1958[1] are: (1) transportation equipment manufacturing, (2) primary metal industries, (3) electrical machinery, (4) machinery (except electrical), (5) contract construction, (6) government — both local and federal, (7) mining, (8) food and kindred products, (9) apparel and other finished textile products, and (10) retail trade.

Industries with largest book net assets in 1958[2] are: (1) iron and steel, (2) electrical equipment, radio and TV, (3) autos and trucks (4) electric power, gas, etc., (5) telephone and telegraph, (6) chemical products, (7) petroleum products and refining, (8) class I railroads, (9) commercial banks, and (10) investment trusts.

The ten companies in the United States employing the largest number of people[3] in 1958 are: (1) General Electric, (2) U. S. Steel, (3) Standard Oil of New Jersey, (4) Western Electric, (5) Bethlehem Steel, (6) Westinghouse Electric, (7) International Telephone and Telegraph, (8) Sperry Rand, (9) Ford Motors, and (10) General Motors.

Considering these leading industries and companies of the United States the "solids" of industrial arts would be selected:

1. *Technical Drawing.* Technical drawing is the fundamental tool of all industrial communication. Every skilled and semiskilled industrial worker needs a knowledge of industrial drawing and blueprint and schematic reading.

2. *General Metalworking.* The metals' industry is a leading industry in the United States. It would rank second to technical drawing in importance as an industrial arts "solid" only on that technical drawing is a necessity in metalwork.

3. *Electricity and Electronics.* The electricity and electronics industry is becoming the second largest industry in the United States. The industrial-arts program realizes that electronics is the most representative of rapid industrial progress. In recognition of its objective to keep pace with industry, more electronics is being offered.

4. *General (or Power) Mechanics.* General mechanics should provide a general knowledge of all engines, including newer forms of liquid and solid fuel combustion engines. Solid- fuel-powered engine is a step forward that should be taken now.

5. *General Woodwork.* The importance of woodworking is decreasing in industrial arts. It is recognizable in the top ten industries only in contract construction. Wood in construction is becoming of lesser importance because of better and stronger materials available.

Woodworking still has its place in industrial arts through the dependence of other areas. It is obvious that schools offering only woodworking are incomplete, and the teacher teaching only furniture making is as obsolete as the "manual-arts" teacher. Colleges overemphasizing less important areas, such as woodworking, should take a serious look at their curriculum.

These five "solids" are listed in the order of their importance or usage in industry. Logically the "solids" should also be included in the curriculum according to their industrial importance. When all areas cannot be included, the areas of lesser importance should be omitted. Other areas may be included for enrichment, but should be secondary to these basic areas based on their positions among the top industries.

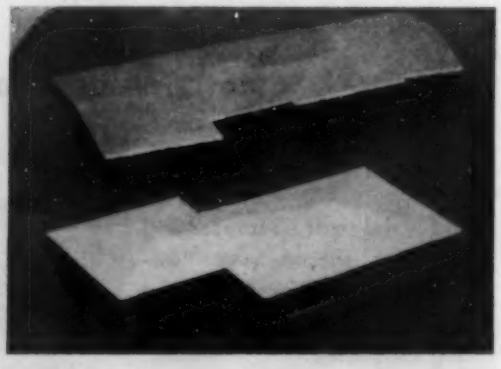
In this "space age" constant examination of curriculum is essential to keep abreast with an ever changing technical society. The objectives should be kept constantly in mind, otherwise we will be teaching a narrow field which has little to contribute to general education. ◀

[1] U. S. Bureau of the Census, *Statistical Abstract of the U. S.: 1959*, Eighteenth edition, Washington, D. C., 1959.

[2] *First National City Bank Monthly Letter — Business and Economic Conditions*, New York, April, 1959.

[3] *Fortune Magazine*, July, 1959.

Mr. McGovern is an instructor in the department of industrial arts, Southeastern State College, Durant, Okla.



Left: the author in his "architectural corner" showing model and drawings. Above: a student perspective. Below: several student models.

Creative Architectural Drafting

VICTOR F. HOFFERT

- This class in basic architectural drawing utilizes an overall **sketch to model** approach.
- In addition to **enriched instructional advantages,** the student gains valuable **home planning experiences.**

In the architectural drafting classes at Herbert Hoover High School, the author emphasizes the better aspects of home planning with good construction practices in the hope that each student will evolve a plan which could become his dream house. With the help of the parent acting as a prospective client, interest is aroused which gives the student a more attractive "stake" in his work.

The choice of a lot, the selection of the type of house, the planning of room arrangement or traffic pattern, and the determination of the exterior covering materials, plus the myriad other decisions, becomes of paramount interest and importance. In order to capitalize upon this interest, the writer has placed in a very limited area much of the material necessary to conduct a class in basic architectural drafting.

The gathering together of materials and information into one locale has these advantages:

1. All instructional supplies are near at hand.
2. The instructor has full control of the learning situation.
3. More pertinent and intelligent questions are asked.
4. More understandable answers are given.
5. The visual-aid materials tend to increase the comprehension and effectiveness of the learning experience.

The student's understanding of usually complicated information is much improved because of the various types of material and their close proximity to each other. Students refer time and again to either photos, blueprints, or models. Discussion with either the instructor or classmates has brought a more thorough understanding of particular problems.

Mr. Hoffert is an instructor of architectural drafting, Herbert Hoover Senior High School in San Diego, Calif.

Pinpointing Instruction

This particular area, usually called the architectural corner, has been created specifically for first-year architectural drafting. Everything is here that is necessary to conduct a lecture, a demonstration, or just to have a casual conversation concerning specific or general information. Each student is given a copy of the architectural drawing syllabus. This syllabus is a compact, informational guide which gives, in condensed form, directions for the drawing of architectural assignments which have previously been covered and reviewed in lectures and demonstrations. For each plate to be drawn, a preliminary statement is made setting forth the purpose and importance of the drawing. Following this preliminary statement, the method of procedure is given. These directions are as complete and concise as is necessary for comprehension and execution. Reference is made to accompanying blueprints which give added information.

The student is often referred to the building codes, both local and F.H.A., for necessary information. The thorough understanding of that part of the building code which applies to small-home construction is considered very important and is stressed at every opportunity.

The first plate the student draws is a sketch ⅛ in. to 1 ft., of the floor plan, roof plan, and front elevation of the house which the student will develop during the year. From this sketch, the ¼ in. to 1 ft. scale drawing of the floor plan is made. The foundation plan follows as do the plates showing the elevations, sections and details, garage, plot, oblique (using the floor plan) mechanical perspective, and the perspective rendering. The construction of the house model takes the remainder of the year.

A syllabus, workbook, or text can go only so far in creating understanding and interest. It was with this in mind that this material is made available in the architectural corner of the classroom.

The Instructor's Model

The model of the house is the focal point from which all other elements of interest in this corner emanate. This model is built to ¼ in. to 1 ft. scale which allows for every structural member found in a full-size house to be shown in its respective location.

Various types of construction are used to show the student that there is usually more than one acceptable method to build a house. The student will observe two ways to block floor joists, four methods to prepare outside walls for final covering, and two methods to brace a wall. The wood shingles are made individually from 1/10-in. balsa, each tapered and placed in position much the same as real shingles. The windows were at first made of sheet plastic but because of shrinkage, were replaced with picture glass. The stucco finish is achieved by brushing varnish on the required surfaces and sprinkling with sand. Scored mahogany veneer gives a realistic impression of vertical tongue-and-groove redwood siding. The fireplace is a solid block of plaster of Paris, with each block painted individually with transparent water colors.

A Picture Is Worth . . . ?

In the architectural corner, directly above the model on the tackboard, are various drawings which are replaced as they relate directly to the work in which the students are presently engaged. These drawings show the general characteristics of the work they are to accomplish with their own house plans. Very often professionally drawn plans are reviewed and discussed, giving the students a more realistic approach to their own drawings.

Enlarged pictures of each major step of construction of the model (and a full-size house as well) eliminate much of the misunderstanding and misconceptions many students have of the what, how, and why of building techniques and procedures. Instruction becomes more meaningful and students are able to grasp the needed information in less time and with more retention.

This architectural corner is designed specifically to create an atmosphere in which the student's interest can be stimulated and held. He can see, point out, and understand better the relationships which exist in this type of activity. It also makes available to the instructor an improved method or avenue of subject presentation.

Observing this corner for the first time creates a favorable impression upon the visitor. This was noted particularly during "open house." Most everyone is interested in miniatures or models, and this model is no exception. Upon close investigation, the visitors see how completely all parts are made and how clearly everything is shown. They discuss with the instructor the many phases of construction and the value of having such material in the classroom. Each visitor leaves with a better understanding of what is offered in this particular course. All of this material is shown as instructional aids during the city-county industrial-arts exhibit where thousands of persons view with interest all of the display.

Student Activities

Almost every instructor finds it most interesting and satisfying to recognize real growth and advancement in his students. It is particularly rewarding to both when so-called nonexistent talents are uncovered. Toward the close of the school year there are two student assignments which provide for such an actuality. One of these assignments has its beginning as a two-point mechanical perspective, using blueprints of the student's floor plan and elevations. This straight-line perspective is transferred to more appropriate paper, and it is from this that the student creates a rendering of his house in a more or less lifelike setting. This type of work is completely new to the students and the results, in most cases, are surprising.

The second student assignment which creates a great deal of interest is the construction of a model of the house made directly from blueprints of his drawings. These models show only the exterior surfaces and do not attempt to show interior construction. Balsa, 1/16-in, is used for the sides and heavy chipboard for the roofs. Various exterior effects are limited only by the resourcefulness of the student. Fine sand is sifted onto surfaces wet with glue to give a stucco effect. Coarser sand is used to simulate a gravel roof. These surfaces, when dry, are painted with latex paint in any desired color.

The tools used are as follows: single-edge razor blades, wood-carving knives, small plane, jeweler's saw, tweezers, pocketknife, pliers, chisels, small clamps, square, dividers, files, small hammer, pens, and an assortment of brushes. Included in the materials are: balsa wood, cardboard, sand, airplane glue, pins, paper clips, wire, tracing cloth, thin plastic, paint, water putty or spackle, and sponges. Other tools and materials may be used, limited only by the individual's needs and originality. All work is carried on in the classroom, using old drawing boards as the working surface.

Some of the more ambitious students have shingled the roofs, even after being warned of the problems and time involved. Some students have sprinkled salt on the wet paint to add a touch of sparkle to the stucco surfaces.

The making of the model is a fitting climax to the year's work. The students feel that this is what they have been working toward, and it adds a sense of completeness for the time and effort spent.

Need for Perspective

The architectural drafting student has the opportunity to gain information and techniques which will help him in later years to understand better and to be aware of many important facts. If he rents or is a prospective home owner, the items concerning proper lot selection, good construction principles, and efficient home planning can always be used as a basis for intelligent choices. ◀

▶ the fifth in a series of articles
on how to apply the principles of a good design
to a variety of i-a areas —

Function and Design

In practically all design activities, the attention sooner or later moves to a consideration of the technical aspects of the problem. How can the legs be joined to the top of this metal table? How can the chair leg be braced for strength? How can the brass stem of a candlestick be fastened to the base? Such questions are characteristically technical, and common to the industrial arts teacher.

What is being kept foremost in the mind in such situations is the most practical, direct, and simplest method of making something work. In other words, the designer is thinking in terms of pure function.

The example of function-at-work presented here concerns the design of a mechanical corner fitting for ¾-in. square aluminum tubing. The students in a design class worked on the problem after a discussion of methods of approaching and analyzing the problem, and studying samples of the tubing. The following design procedure was used:

1. Statement of the problem
2. Analysis and research
   a) size of tubing
   b) interior dimensions
   c) thickness of wall
   d) general characteristics of aluminum
   e) strength
3. Preliminary sketching and planning
   a) jot down ideas
   b) sketch ideas
   c) alter and refine
   d) plan sequence of operations
4. Experimentation with materials and ideas
   a) make models
   b) make mock-ups or prototypes
   c) revise sketches
5. Final working sketch

A solution to this design problem is illustrated in one of the accompanying drawings. It was the culmination of an activity involving analysis, the weighing of alternatives, sketching and refining, and experimentation. A wooden model of the fitting was constructed and tested as part of the experimentation. Subsequent to this, a prototype was made of cast aluminum according to the following schedule:

1. A pattern of the corner fitting was made.

2. The pattern was rammed up and cast in aluminum.

3. The cast aluminum fitting was machined to size.

4. Holes were drilled and tapped in the fittings.

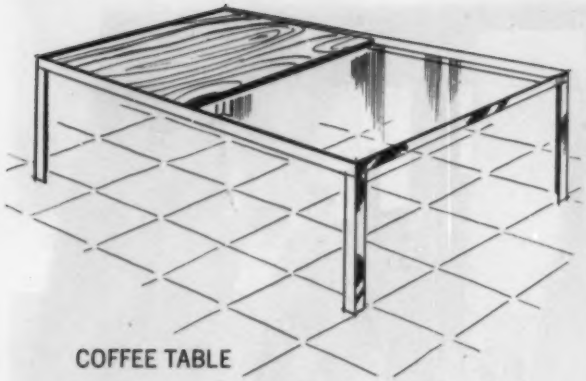
5. Three short pieces of ¾-in. square aluminum tubing were cut, and holes corresponding to those in the fittings were drilled and countersunk.

6. The sample unit was assembled and fastened with machine screws.

In evaluating the fitting, the primary criteria was function. Did it work; did it do the job for which it was intended? The answer here was positive, for the fitting did indeed meet the requirements of the specific situation. When evaluating projects, criteria such as craftsmanship, appearance, or "visual organization," and good use of materials must be considered in addition to function. But in the case of the corner fitting, function emerges as the prime factor for the simple reason that the problem at hand was one of devising a workable joining method. It may not serve the requirements of every possible case where such tubing might need to be joined, nor was it intended to. The next step would be to find a use for the joining system in practical situations. Some of these possible uses are for bookcases, tables, and cabinets, as shown in the drawing. ◀

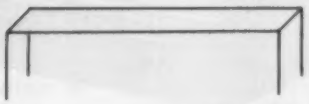
DESIGN for the TEACHER

john r. lindbeck
Assistant Professor of Industrial Education, Western Michigan University, Kalamazoo, Mich.



COFFEE TABLE

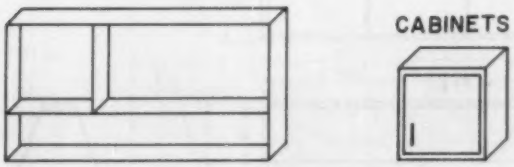
APPLICATIONS OF THE CAST FITTING



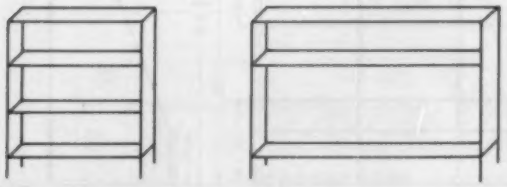
CAST ALUMINUM FITTING—

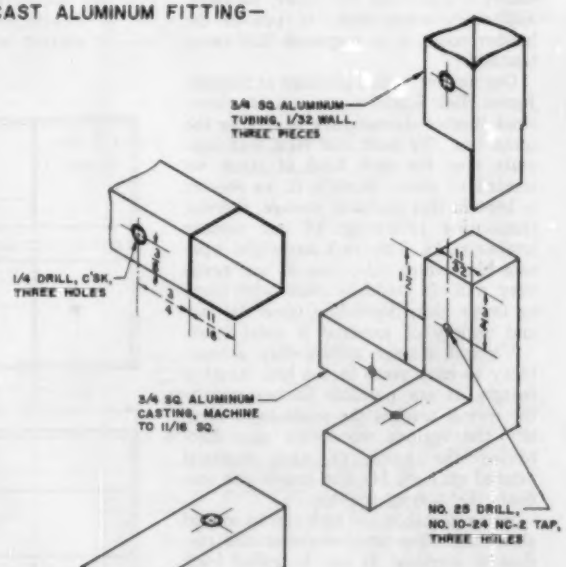
TABLES

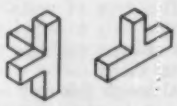
CABINETS



BOOKCASES




3/4 SQ. ALUMINUM TUBING, 1/32 WALL, THREE PIECES
1/4 DRILL, C'SK, THREE HOLES
3/4 SQ. ALUMINUM CASTING, MACHINE TO 11/16 SQ.
NO. 25 DRILL, NO. 10-24 NC-2 TAP, THREE HOLES



VARIATIONS OF THE FITTING—

Solving the Scrap Box Problem

JAMES L. HOERNER
Industrial Arts Instructor
Sequoia Junior High School, Fontana, Calif.

An age-old problem in industrial-arts shops has been the storing of short stock so it is easily accessible to the student. In most cases, the short, usable stock is tossed into a large box. Before long, the box is heaped high with odds and ends of all kinds of material. At this point we have a large box of scrap. The reason it is scrap is because it is impossible to locate the piece we are looking for. Oh, every now and then we clean out the box and discard the small pieces. Then we start over again, encouraging the boys to "please look in the scrap box first," before getting a nice, new board out of storage. Regardless of how hard we push, however, the box is soon heaped high again. If the box is put out in the shop where it is handy, it becomes a waste can for paper, shavings, and every other item. If put in the lumber room, it is forgotten and never touched.

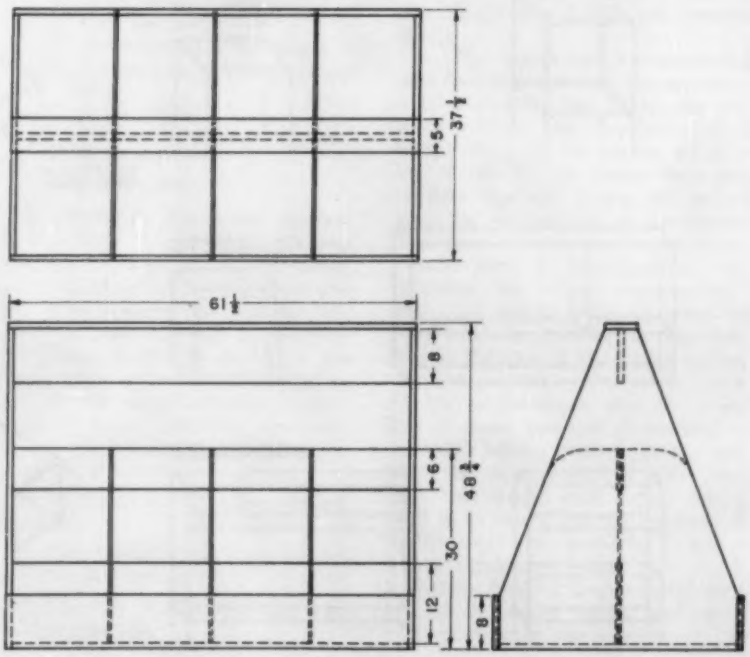
Our answer to this problem at Sequoia Junior High School was a portable short-stock-lumber storage rack to replace the scrap box. We built our rack with separate bins for each kind of stock we wanted to store. Stock 4 ft. or shorter is kept in this portable storage, thereby eliminating cluttering of our regular lumber racks. This rack has eight separate bins which take care of our needs very well. It could be built with more or fewer bins, depending upon the size and variety of material it must store.

Vertical storage allows easy accessibility to each piece in the bin. Another feature of our portable lumber rack is the way it teaches the students to identify the various woods we use. Also, having the name of each material printed on each bin has taught the students the correct spelling.

Being portable, the rack can be moved about the shop area wherever the student is working. It can be rolled back into the lumber room when not in use.

This type of portable storage is not limited only to wood shops, but with a few changes could be very adaptable to metal shops.

Although this may not be the final or best design for a portable storage rack, it has been a great improvement over the big, ugly, scrap box.



Blanking punch and die mounted in a commercial die set.

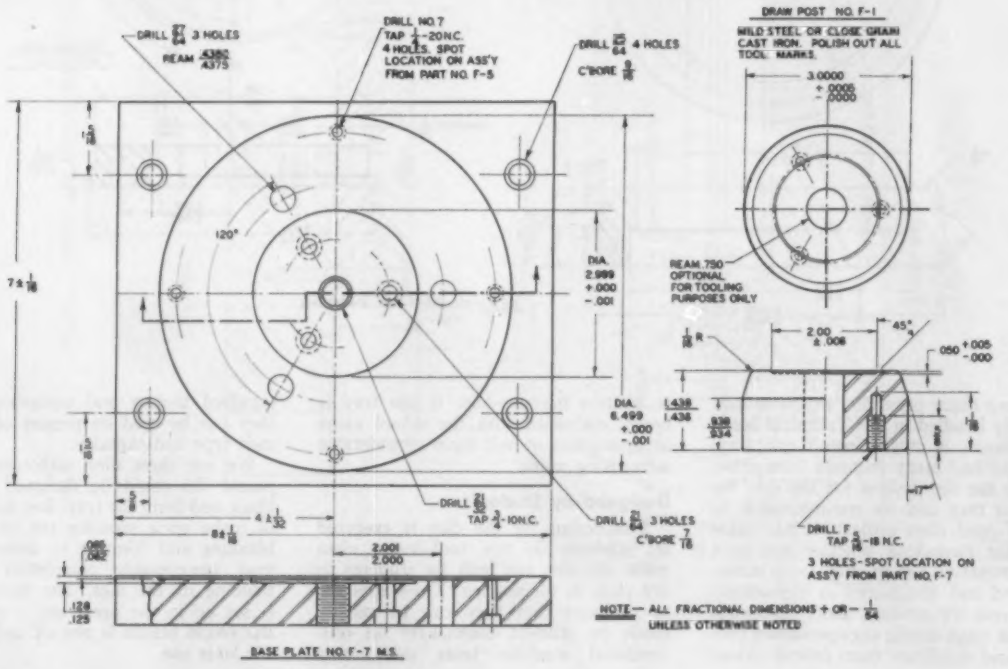
Forming dies shown partially disassembled with ash tray.

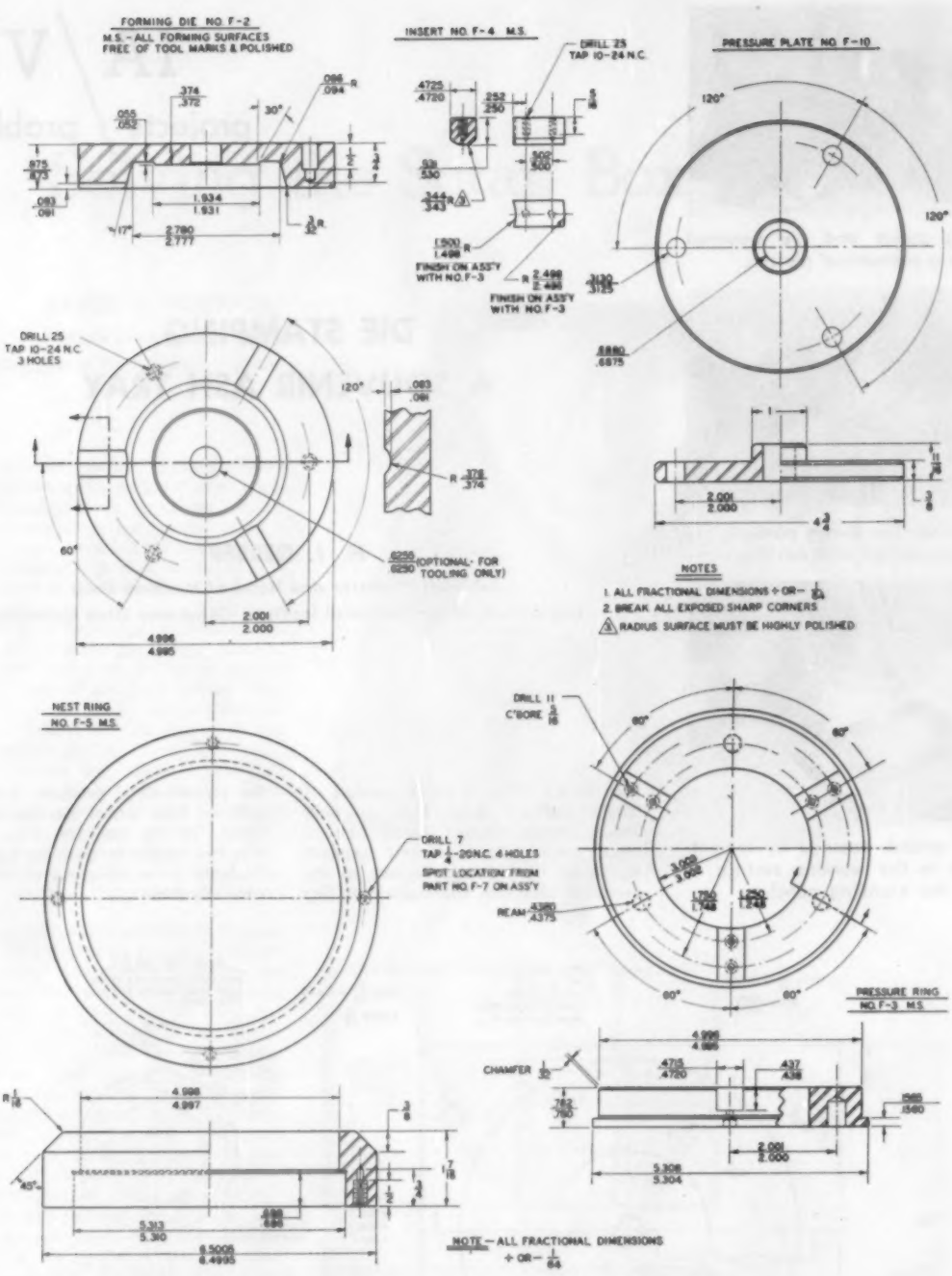
Prevent scratch damage by cementing felt to the working surface of the blanking punch.

DIE STAMPING A SOUVENIR ASH TRAY

H. J. GERBER
Assistant Professor and Head of Machine Shop
Department of the Technical Institute, Oklahoma State University

In recent years, quite a number of school machine shops have acquired punch presses. Others would like to install them as part of their standard equipment but hesitate because of the prevalent idea that the making of dies for pressed-metal products is too difficult for high school machine-shop students. To the contrary, even complex dies can readily be made by high school students if the designing of the dies is carefully done.



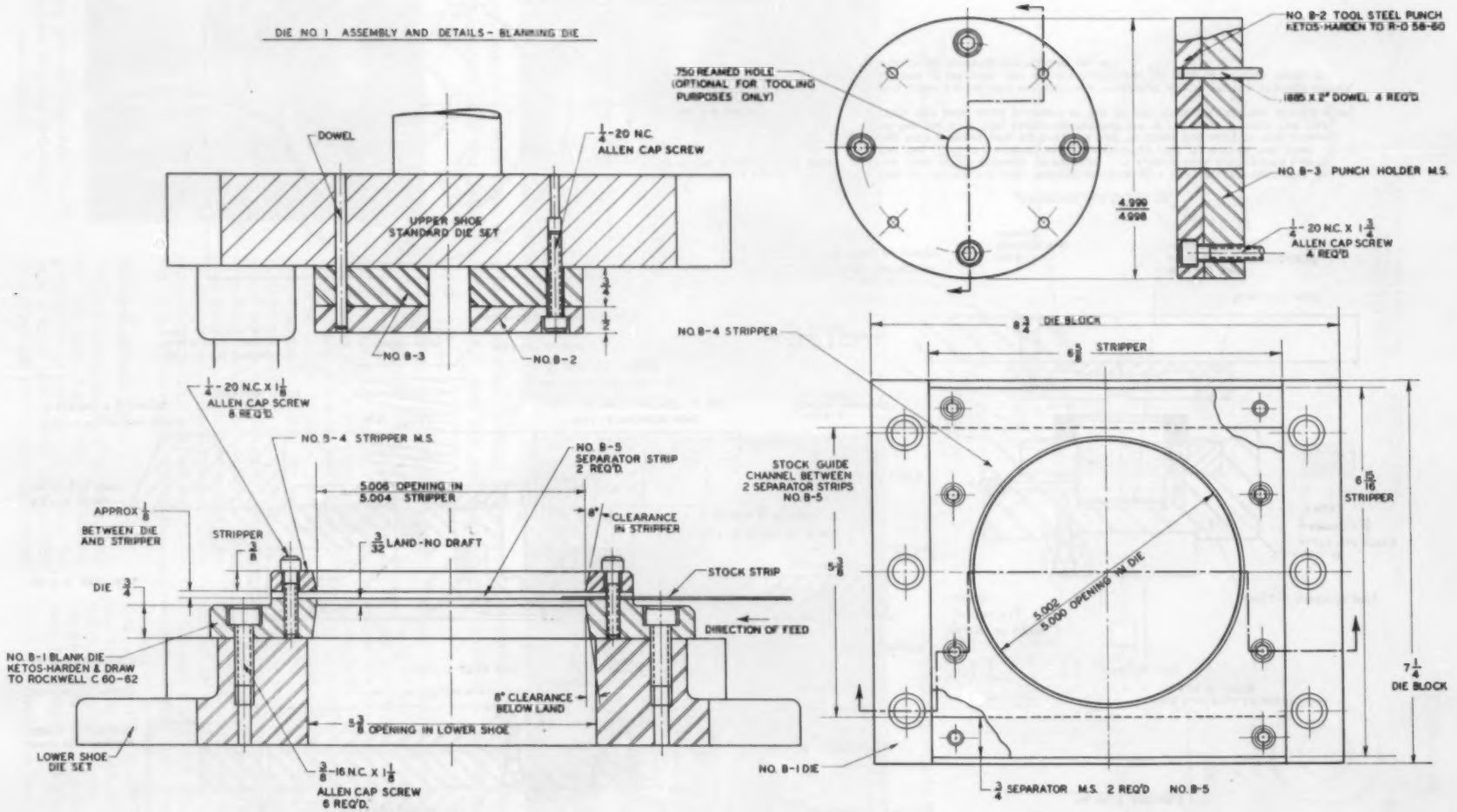

FORMING DIE NO. F-2
M.S. - ALL FORMING SURFACES FREE OF TOOL MARKS & POLISHED
INSERT NO. F-4 M.S.
DRILL 25 TAP 10-24 N.C.
PRESSURE PLATE NO. F-10
FINISH ON ASS'Y WITH NO. F-3
FINISH ON ASS'Y WITH NO. F-3
DRILL 25 TAP 10-24 N.C. 3 HOLES
(OPTIONAL- FOR TOOLING ONLY)
NOTES
1. ALL FRACTIONAL DIMENSIONS ÷ OR- 1/64
2. BREAK ALL EXPOSED SHARP CORNERS
3. RADIUS SURFACE MUST BE HIGHLY POLISHED
NEST RING NO. F-5 M.S.
DRILL 7 TAP 1/4-20 N.C. 4 HOLES SPOT LOCATION FROM PART NO. F-7 ON ASS'Y
DRILL 11 C'BORE
REAM
PRESSURE RING NO. F-3 M.S.
CHAMFER
NOTE - ALL FRACTIONAL DIMENSIONS ÷ OR- 1/64

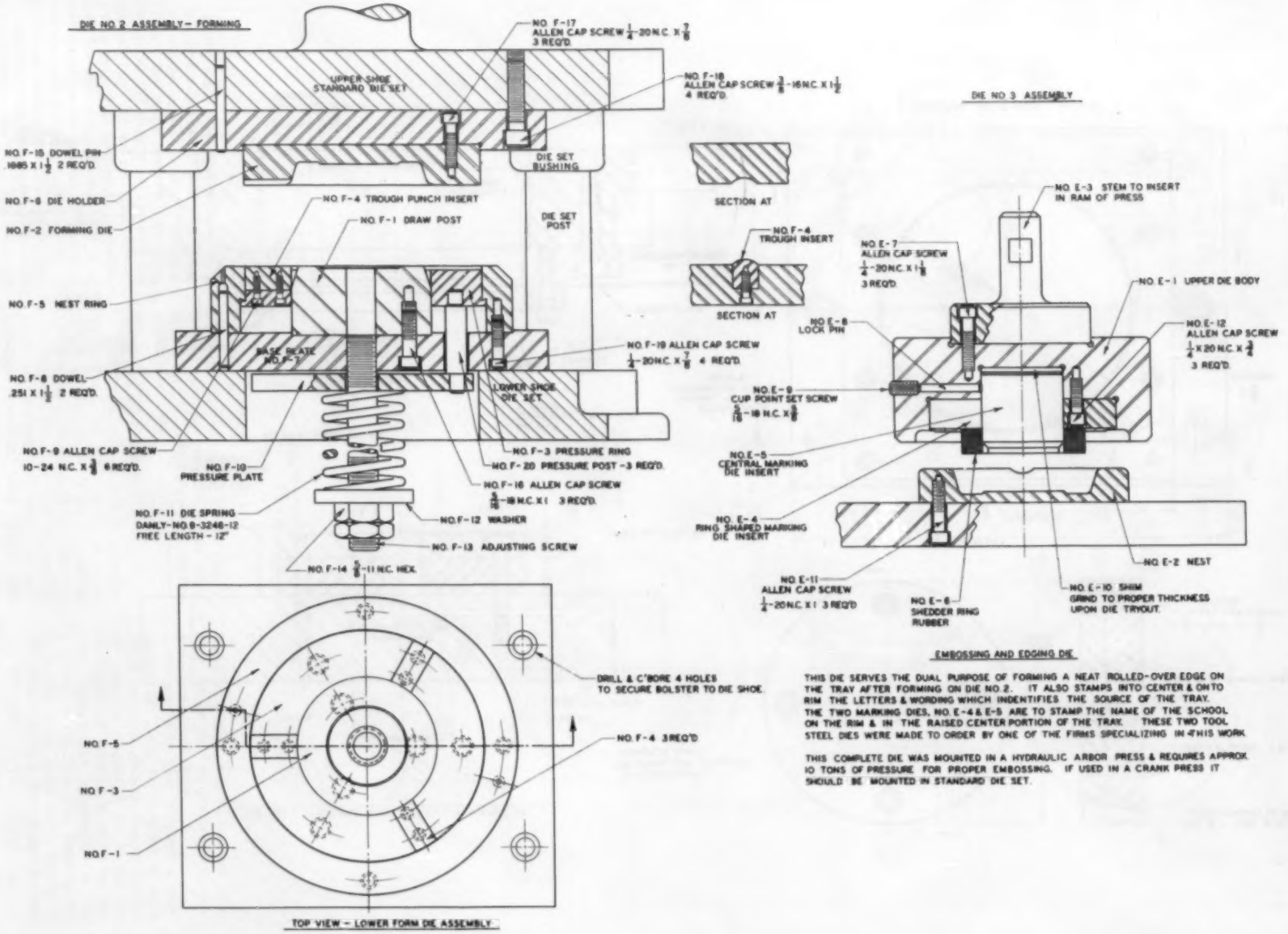
Among many presswork problems successfully handled in our Technical Institute classes is this souvenir ash tray. We have had many requests from other schools for the designs for the dies for this ash tray and we recommend it as a very good class project. It has value both for diemaking practice and as a very attractive end product to be manufactured and distributed as a souvenir. Each year we produce many thousands of these trays during our open-house program and distribute them free of charge to visitors in our shop. If the tray is neatly embossed with the school name or monogram, it will have considerable advertising value.

Designed by Students

The design for the dies is executed by students in my tool-design class while the dies are built by students in my class in toolmaking. These dies are so designed that they can be readily made by student toolmakers on conventional machine tools using only standard tooling and equipment. Also, they can be used on presses of a common type and capacity.

We use three dies, although a compound die could be designed to both blank and form the tray. But we decided to make up a separate set of dies for blanking and forming in order to prevent unnecessary complexity in the building of the dies. The blanking die is set up in the press and a supply of flat round blanks is run off and stocked for later use.

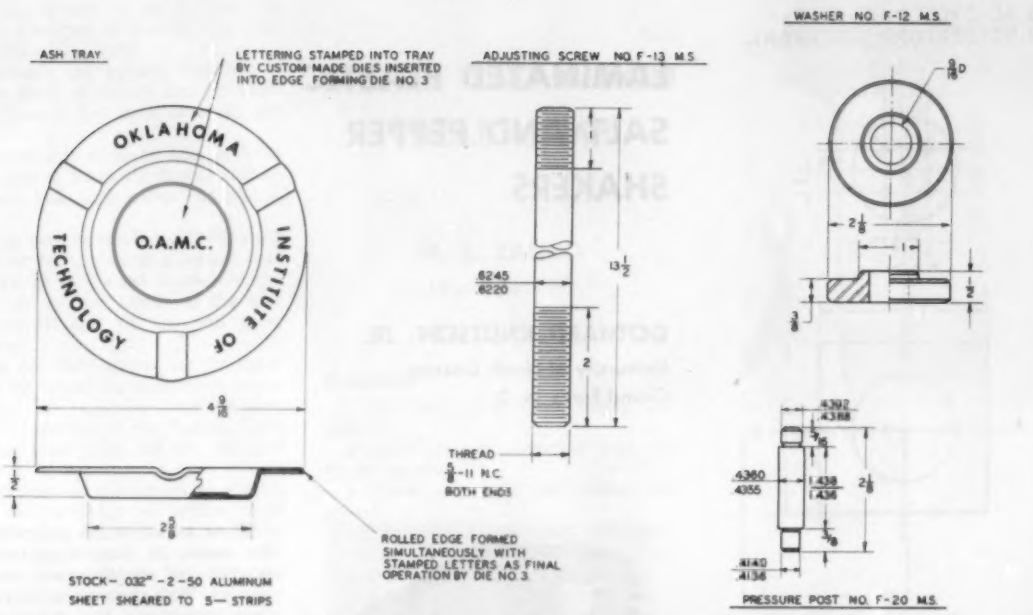

DIE NO. 1 ASSEMBLY AND DETAILS - BLANKING DIE
DOWEL
¼-20 N.C. ALLEN CAP SCREW
UPPER SHOE STANDARD DIE SET
NO. B-3
NO. B-2
¼-20 N.C. X 1⅛ ALLEN CAP SCREW 8 REQ'D.
NO. B-4 STRIPPER M.S.
NO. B-5 SEPARATOR STRIP 2 REQ'D.
5.006 OPENING IN 5.004 STRIPPER
APPROX. ⅛ BETWEEN DIE AND STRIPPER
STRIPPER ⅜
3/32 LAND - NO DRAFT
8° CLEARANCE IN STRIPPER
DIE ¾
STOCK STRIP
DIRECTION OF FEED
NO. B-1 BLANK DIE KETOS-HARDEN & DRAW TO ROCKWELL C 60-62
8° CLEARANCE BELOW LAND
5⅜ OPENING IN LOWER SHOE
LOWER SHOE DIE SET
⅜-16 N.C. X 1⅛ ALLEN CAP SCREW 6 REQ'D.
.750 REAMED HOLE (OPTIONAL FOR TOOLING PURPOSES ONLY)
NO. B-2 TOOL STEEL PUNCH KETOS-HARDEN TO R-O 58-60
.1885 x 2" DOWEL 4 REQ'D.
NO. B-3 PUNCH HOLDER M.S.
4.999 4.998
¼-20 N.C. X 1¾ ALLEN CAP SCREW 4 REQ'D.
NO. B-4 STRIPPER
8¾ DIE BLOCK
6⅜ STRIPPER
STOCK GUIDE CHANNEL BETWEEN 2 SEPARATOR STRIPS NO. B-5
5⅜
5.002 5.000 OPENING IN DIE
6 15/16 STRIPPER
7¼ DIE BLOCK
NO. B-1 DIE
¾ SEPARATOR M.S. 2 REQ'D NO. B-5

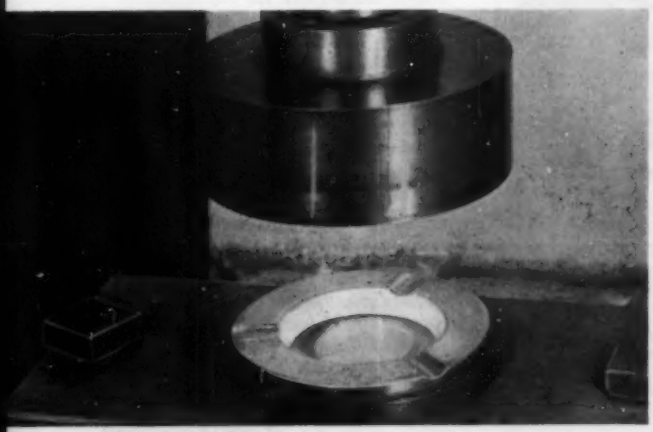

DIE NO. 2 ASSEMBLY – FORMING
NO. F-17 ALLEN CAP SCREW 1/4-20 N.C. X 7/8 3 REQ'D.
NO. F-18 ALLEN CAP SCREW 3/8-16 N.C. X 1 1/2 4 REQ'D.
UPPER SHOE STANDARD DIE SET
DIE SET BUSHING
NO. F-15 DOWEL PIN .1885 X 1 1/2 2 REQ'D.
NO. F-6 DIE HOLDER
NO. F-2 FORMING DIE
NO. F-4 TROUGH PUNCH INSERT
NO. F-1 DRAW POST
DIE SET POST
NO. F-5 NEST RING
BASE PLATE NO. F-7
NO. F-19 ALLEN CAP SCREW 1/4-20 N.C. X 7/8 4 REQ'D.
NO. F-8 DOWEL .251 X 1 1/2 2 REQ'D.
LOWER SHOE DIE SET
NO. F-9 ALLEN CAP SCREW 10-24 N.C. X 3/4 6 REQ'D.
NO. F-10 PRESSURE PLATE
NO. F-3 PRESSURE RING
NO. F-20 PRESSURE POST -3 REQ'D.
NO. F-16 ALLEN CAP SCREW 5/16-18 N.C. X 1 3 REQ'D.
NO. F-11 DIE SPRING DANLY-NO. 9-3248-12 FREE LENGTH - 12"
NO. F-12 WASHER
NO. F-13 ADJUSTING SCREW
NO. F-14 5/8-11 N.C. HEX.
SECTION AT
NO. F-4 TROUGH INSERT
SECTION AT
DIE NO. 3 ASSEMBLY
NO. E-3 STEM TO INSERT IN RAM OF PRESS
NO. E-7 ALLEN CAP SCREW 1/4-20 N.C. X 1 1/8 3 REQ'D.
NO. E-1 UPPER DIE BODY
NO. E-8 LOCK PIN
NO. E-12 ALLEN CAP SCREW 1/4 X 20 N.C. X 3/4 3 REQ'D.
NO. E-9 CUP POINT SET SCREW 5/16-18 N.C. X 3/8
NO. E-5 CENTRAL MARKING DIE INSERT
NO. E-4 RING SHAPED MARKING DIE INSERT
NO. E-2 NEST
NO. E-11 ALLEN CAP SCREW 1/4-20 N.C. X 1 3 REQ'D.
NO. E-6 SHEDDER RING RUBBER
NO. E-10 SHIM GRIND TO PROPER THICKNESS UPON DIE TRYOUT.
DRILL & C'BORE 4 HOLES TO SECURE BOLSTER TO DIE SHOE.
NO. F-5
NO. F-3
NO. F-1
NO. F-4 3 REQ'D.
TOP VIEW – LOWER FORM DIE ASSEMBLY

EMBOSSING AND EDGING DIE

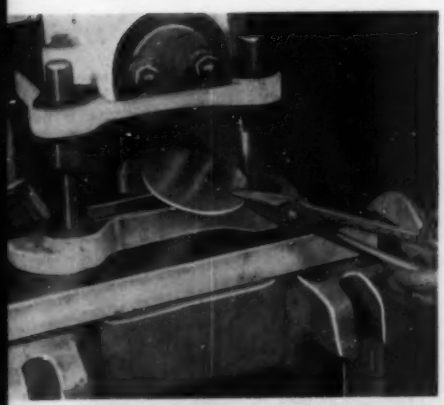
THIS DIE SERVES THE DUAL PURPOSE OF FORMING A NEAT ROLLED-OVER EDGE ON THE TRAY AFTER FORMING ON DIE NO. 2. IT ALSO STAMPS INTO CENTER & ONTO RIM THE LETTERS & WORDING WHICH INDENTIFIES THE SOURCE OF THE TRAY. THE TWO MARKING DIES, NO. E-4 & E-5 ARE TO STAMP THE NAME OF THE SCHOOL ON THE RIM & IN THE RAISED CENTER PORTION OF THE TRAY. THESE TWO TOOL STEEL DIES WERE MADE TO ORDER BY ONE OF THE FIRMS SPECIALIZING IN THIS WORK.

THIS COMPLETE DIE WAS MOUNTED IN A HYDRAULIC ARBOR PRESS & REQUIRES APPROX. 10 TONS OF PRESSURE FOR PROPER EMBOSSING. IF USED IN A CRANK PRESS IT SHOULD BE MOUNTED IN STANDARD DIE SET.





Left: partially completed work piece set up in combination forming and stamping operation. Right: removing a formed workpiece from the draw die. The punch and die are in an inverted position in the die set.



Blank being placed between punch and die for the cup drawing operation.

We have only two presses available, a 25-ton capacity crank press and a small hydraulic arbor press of about nine-ton maximum capacity. We mount the forming dies in the crank press and the combined embossing and edge forming dies in the hydraulic press. With this arrangement, using the previously blanked-out disks, we can make up completed ash trays on the spot during our open-house exhibit. If necessary, these final operations can be done on one press by changing dies after forming and then doing the embossing and final edge forming as the demonstration operation.

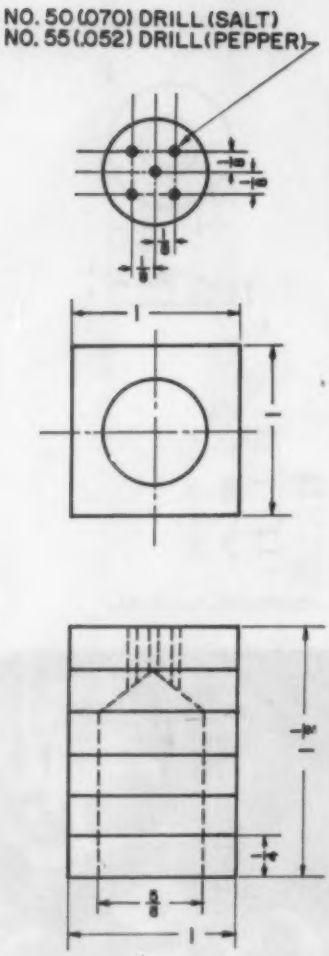
Public-Relations Value

These operations draw spectators, and we feel that, aside from the student satisfaction in a project of this sort, we gain a great deal public relations-wise by having this job running continuously during our annual open house.

Costs are very reasonable for a project of this sort. We had on hand a number of used die sets, into which the dies are mounted on the press, but these can easily be made by students or purchased as a stock commercial product at a reasonable cost. Not having a suitable engraving machine at the time, we purchased two custom-made embossing dies for stamping our school name in the trays. Their cost — about $50 — was charged up to advertising.

We have found that dies of this sort, if made of mild steel, are quite satisfactory for forming copper and aluminum alloys. This avoids problems of heat treatment and the subsequent precision-grinding operations. Of course, the blanking dies must be made of tool steel, heat-treated, and ground.

(Concluded on page 40)



LAMINATED PLASTIC SALT AND PEPPER SHAKERS

GOTHARD KNUTSON, JR.
University of North Dakota
Grand Forks, N. D.

These attractive salt and pepper shakers make an interesting project for seventh and eighth grade students in plastics. With their multicolored crystal-clear appearance, the shakers will be a conversation piece for the table.

In making this project the student will do the following hand operations: lay out stock, cut out stock, drill stock, hand filing and rough filing, buffing and polishing, cementing, and laminating.

Procedure

1. Set up the rip fence on the band

GRINDING A TOOL BIT

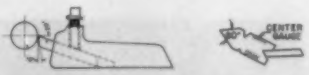
FRED A. CULWICK
Instructor of Machine Shop
U. S. Grant Senior High School, Van Nuys, Calif.

Many years ago, when the author was still a very new apprentice machinist, he was troubled by the trial-and-error method used by machinists to grind lathe-cutting tools. They would go to a grinder with a tool bit numerous times before they were satisfied with the job the tool bit was doing. When asked about their actions, they would reply that you had to develop the knack of grinding tool bits and that the best could rarely get a tool just right without numerous trials.

This prompted an exploration of methods and gauges that would take trial and error out of offhand tool grinding. A number of methods and gauges became standard for use in industry but one needed patience with their limitations and drawbacks. But when the author started to teach, he learned that few students had the patience to cope with these methods of gauging. This prompted the breaking of tool-bit grinding into the following procedure, which has proven infallible and invaluable with high school and adult students as well.

Determining Angles

Most tool-bit holders have a square hole which makes an angle of about 20



deg., with the base of the holder. A tool must have about 10-deg. front clearance to cut, when the cutting tip is set about 5 deg. above the center line of the work. We are thus left with an angle of 60 deg. between the top of the tool bit and its face. This angle can be gauged with the common center gauge.

After this front-clearance angle is ground properly, a system of parallel lines will carry the student to the completion of grinding a lathe tool bit which will cut every time.

Side Clearance

The proper side clearance is obtained by grinding the side face so that it is a parallelogram as illustrated. If the cutting edge makes an angle of less than

saw or the jig saw to cut a 1-in. strip of ¼-in. Plexiglas or Lucite. Cut 1-in. squares from this strip.

2. Laminate six squares together to form one block of plastic. Use different-colored cement for each layer in the block.

3. Square this stock to size, make it with a taper or make the blocks square.

4. Sand, buff, and polish the plastic blocks.

5. A jig may be made for drilling the ⅝ in. hole by mortising a square hole in a piece of hardwood to receive the plastic. Lay out the center of the hole on the plastic and set the drill press depth stop.

6. Lay out the location for the small holes on the top of the shakers on masking paper. The masking paper is then fastened to the top of the shakers. Drill the proper-sized holes for the salt and the pepper.

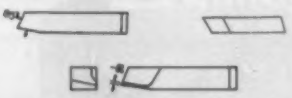
This project is economical in that it enables the students to utilize small pieces of sheet plastic that normally would be thrown away. The sizes indicated on the drawing are optional; the salt and pepper shakers may be made any size.

Plugs for the salt and pepper shakers may be turned on the lathe or cut out of plastic rod. A slot should be cut on the plug for a screw driver. The threads may be cut with a die and done by hand.

90 deg. (about 85 deg.) with the top edge of the front clearance when the tool is viewed from the top, the versatility, stability, and life span of the tool bit are increased.

The back rake of the tool is provided for automatically by the slant of the hole in the toolholder so all that remains is to provide for the side rake. This is the most difficult and disheartening operation for the beginner.

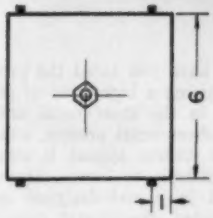
Here again we employ parallel lines to guide us as shown here.

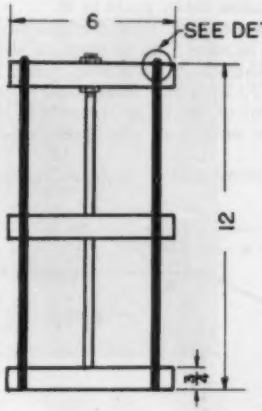


This is the only time the full face of the wheel is not employed and the corner of the wheel is allowed to cut into the tool bit. If one holds the cutting edge of the tool bit parallel to the center line and face of the grinding wheel the desired result is obtained. You will note that there is a land about 1/32 in. wide from the cutting edge to the end of the grind for the side rake. I have two purposes for leaving this land. One is to provide a stronger and a more durable cutting edge. The other is to maintain a reference for gauging purposes.

METAL AND WOOD TABLE LAMP

M. L. ZANCO
Waukegan, Ill.





Procedure

1. Get out stock (soft maple and metal).
2. Allow 1/16 in. oversize and cut maple to size.
3. Plane all ends and edges and square.
4. Sand all surfaces, ends, and edges.
5. Lay out center holes (⅜-in. bit) and drill.
6. Lay out holes for screws. Use a ⅛-in. bit and drill holes ¼ in. deep.
7. Cut out metal stock (¼ x ¼ x 12 in.).
8. File ends. Follow illustration.
9. Lay out holes.
10. Center-punch each hole.
11. Drill holes. ⅛-in. HS metal bit. Use oil when drilling.
12. File burrs around holes.
13. Clean metal with benzine and a rag.
14. Dip or brush lacquer to the metal.
15. Finish-sand the three maple pieces.
16. Apply the finish to the maple. (*a*) Use shellac as a base and allow to dry for two hours. (*b*) Rub down with a fine steel wool and dust. (*c*) Brush on a clear gloss varnish. (*d*) Rub down lightly with steel wool. (*e*) Wax and polish.
17. Attach the threaded pipe and the pipe locknut to the top section of the lamp.
18. Assemble.

Tools and Equipment

Crosscut and ripsaw, jack plane, try square, bit and brace, pencil, rule, hand drill, hack saw, metal file, awl, punch, drill press, machine oil, benzine, rag, finish and ½ garnet and 3/0 aluminum oxide fine.

Bill of Materials

No. of pcs.	*Material*	*Size*
3	Soft maple	¾ x 6 x 6"
4	Square mild steel	¼ x ¼ x 12"
1	Socket and plug	
8 ft.	Electric cord	Type SPT-1, No. 18
1	Threaded pipe	⅛" o.d., ⅜"–1½"
2	Pipe locknuts	⅜"
12	Blued r.h. wood screws	
	Shellac and varnish	
	Sandpaper and steel wool	
1	Bulb	
1	Lampshade	
	Black lacquer	

MAGAZINE HOLDER

KENNETH R. THOMAS

San Diego High School, San Diego, Calif.

How often have you faced the problem of maintaining a high level of student interest in the sheet-metal area? A functional sheet-metal project, which has a definite student appeal, is sometimes quite difficult to locate. If you are interested in a well-designed and easily constructed sheet-metal project, this magazine holder could be it.

It was designed with the following purposes in mind: (1) to design a magazine holder which could be attached to a wall; (2) To utilize sheet metal in the fabrication of the project; and (3) To make the project as simplified as possible.

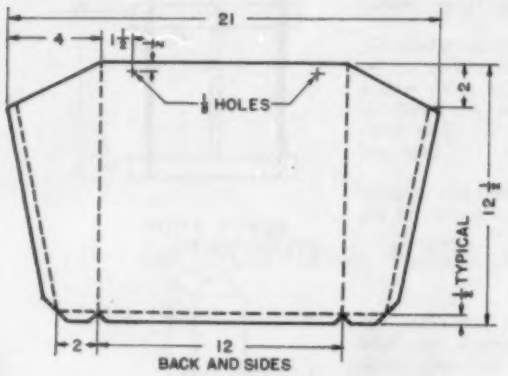
The following tools, machines, and operations were employed: (1) Layout — steel rule, and scriber; (2) Cutting — squaring shear, tinner's snips, and whitney punch; (3) Forming — bar folder, and box and pan brake; (4) Fabrication — soft soldering; and (5) Finish — spray painting.

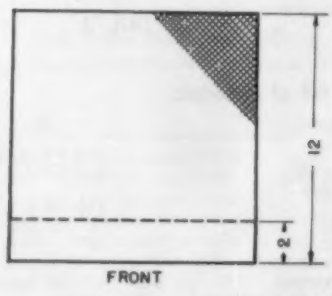
Procedure

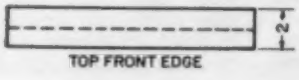
1. Lay out the patterns on the desired metal.
2. Cut the metal to size.
3. Bend the bottom and side edges to 90 deg. with the bar folder.
4. Bend the sides to 90 deg. with the box and pan brake.
5. Bend the front piece to 80 deg. with the box and pan brake.
6. Soft-solder the front piece into position. This may be done most conveniently from the inside for the front edge, and from the outside for the bottom edge.
7. Punch the holes for mounting.
8. Prepare the metal for finishing.
9. Apply the flat black lacquer to the metal.
10. Bend the material for the top front edge to 180 deg. with the bar folder.
11. Buff or polish the top front piece to the desired finish or luster.
12. Apply the clear lacquer to the metal.
13. The magazine holder may now be completed by pressing the top front edge piece into position over the exposed edge of the front material.

Bill of Materials

Name of Part	*Material*	*Size*
Back and sides	Sheet metal, preferably galvanized, 22 or 24 ga.	12½" x 21"
Front	Perforated or flat expanded metal	12" x 12"
Top front edge	Aluminum, brass or copper, 22 ga.	2" x 12"
Several snippets of solder		
Clear and flat black lacquer		

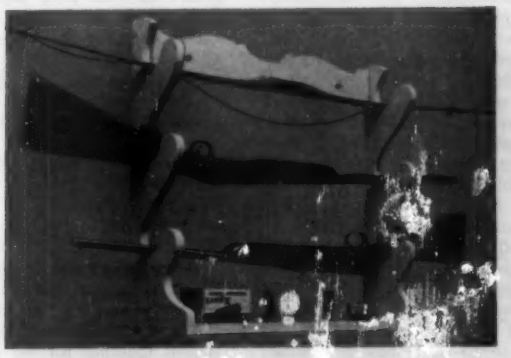






THRIFTY GUNRACK

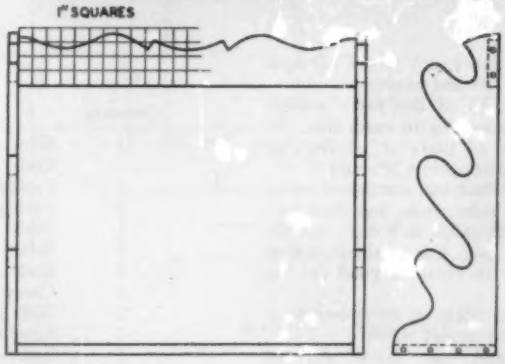
EDWARD H. SEMPERT
Industrial Arts Department
Cheektowaga Central School, Buffalo, N. Y.

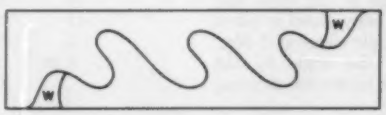


The accompanying sketch indicates the reason for this title; the only waste involved are the pieces marked "W." A gunrack is a perennial favorite among boys; this one, in addition to its economical features, has the virtue of providing for as many guns as desired.

Procedure

1. Rip and joint a ¾-in. board to exactly 7 1/16 in. wide. Square one end.
2. Square off this end of the board with a fine-tooth handsaw.
3. Jig-saw very carefully exactly on the pencil lines.
4. Make a half template for the upper cross member as shown.
5. Square a board to exactly ¾ by 3½ by 24 in. Trace half template; then jig-saw out the upper cross member.
6. Square up the lower cross member to ¾ by 7 by 24 in.
7. Smooth all curved edges with file and sandpaper.
8. Sand all edges and surfaces to remove defects and millmarks.
9. Assemble as shown, using 1½ in. No. 9 flathead woodscrews, counterboring for ⅜ in. birch chair buttons.
10. To fasten the gunrack to the wall use heavy shelf hangers. These should be fastened a distance apart on the back of the upper crossmember to coincide with the centerline of the wall studs which may not always be exactly 16 in. on centers. Determine this and then fasten the hangers with two ⅝-in. No. 5 flathead screws each. Use 1¼-in. No. 10 roundhead woodscrews in going through the eye of the hangers into the wall.





CERAMIC-TILE TABLES

JAMES SCHILLEMAN
Instructor, Pilgrim Park Junior High School
Elm Grove, Wis.

One of the newer trends in the use of ceramic tiles is their application to furniture. The pieces with which this article concerns itself involve a material cost of approximately $30. Educationally, they provide for originality and entail a host of operations both basic and advanced, depending on the design used. The designs can vary by way of tile shapes, sizes, and colors in the dull, satin, or gloss finish. The tops are practically marproof and can be cleaned with a damp cloth.

These tables are made of "Korina" and tiles in five compatible colors. The end tables can have planters or books in their wells, depending on one's desires. The compound miter joints could be eliminated and replaced with ordinary miters and the legs could be mounted at right angles to the tops rather than at 15 deg., making it easier for the builder.

Procedure

1. Select lumber and secure plywood pieces. Order tile and hardware.

2. Lay out all of the parts needed, allowing for trimming to exact size.

3. Cut out all parts at 90 deg., to begin with. Miter joints later on.

4. Lay out and cut compound miter joints for all sides, ends, and shelf facings. Set miter gauge at 8 deg., and tilt blade to 45 deg. Use a sharp hollow ground blade to obtain a good cut for gluing.

5. Joint the edges of these boards at 8 deg., to their proper width.

6. Finish-sand the inside exposed parts of these boards.

7. Cut the plywood tops to their exact size, so that when assembled with the sides and ends, there will be 5/16 in., from their tops to the tops of the ends and sides. These tops are only glued in place so be sure to bevel their edges at 8 deg., to correspond with the angle of the sides and ends. Refer to section drawing *C*.

8. Assemble the sides, ends, and tops of each table using bar clamps and the clamping blocks illustrated in detail drawing *E*. By using these blocks, the compound miter joints will be pulled together at both their tops and bottoms simultaneously. CAUTION: Use moderate clamp pressure and be sure to remove all traces of excess glue.

9. Cut out and plane the well bottoms to their exact size. Sand their exposed surface and glue into place. Again, remove excess glue.

10. Sand all surfaces thus far assembled to a smooth finish. Round all arrises somewhat.

11. Cut out, fit, and glue the front leg supports into place. NOTE: For added strength, glue several of the clamping blocks into place as shown in the drawing of the end tables.

12. Glue three or four well-matched boards together for the shelf.

13. Kerf the underside of the shelf spacing the saw cuts about ½ in. apart and ⅜ in. deep. This operation will prevent warping.

14. Cut and joint the shelf to its exact size leaving an 8-deg. angle on its edges and ends. Glue on the facing strips using the clamping blocks once again to pull up the corners properly.

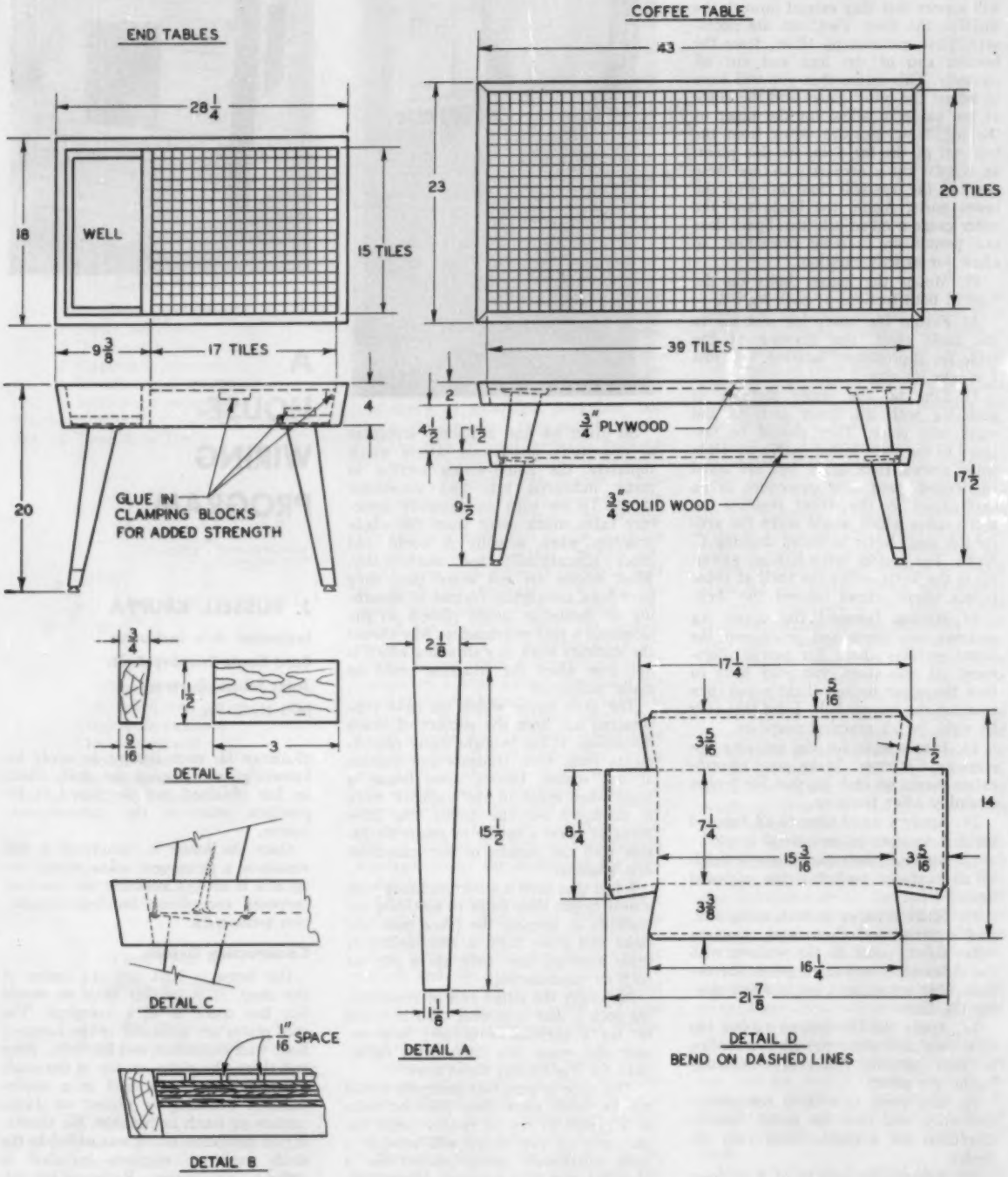
15. Sand the shelf, completely rounding all arrises a little.

16. Select stock for the legs of the tables — 12 pieces, squaring both ends to obtain 15½ in. in length. Then glue three ¾-in. pieces together to get proper diameter and joint off their arrises until the legs are octagonal in shape, thus saving time on the lathe.

17. Turn out these twelve legs to proper dimension. Sand completely, rounding the bottom ends somewhat. Mount the hanger bolts and bore the

Bill of Materials

Quantity	*Part*	*Size*
2	Sides	¾" x 2" x 43"
2	Ends	¾" x 2" x 23"
2	Facings	¾" x 1½" x 41"
2	Facings	¾" x 1½" x 21"
1	Shelf	¾" x 19½" x 39½"
4	Sides	¾" x 4" x 28¼"
4	Ends	¾" x 4" x 18"
2	Crosspieces	¾" x 4" x 16½" (rgh)
2	Well bottoms	¾" x 7½" x 16" (rgh)
2	Exterior plywood tops	¼" x 16¼" x 18¼"
1	Exterior plywood top	¼" x 21½" x 41½"
2	Leg supports	¾" x 5" x 16" (rgh)
12	Legs, tapered	2½" to 1½" x 16"
1290	Tiles	¼" x ¼" x 1"
3 lb.	Tile grout	
16	Leg mounting plates	
12	Swivel glides	1¼"
2	Sheet metal	18 ga. x 14" x 21⅞"
1 pt.	Tile cement	
	Glue, screws, sandpaper, and finish	


END TABLES
28 1/4
18
WELL
15 TILES
9 3/8
17 TILES
4
20
GLUE IN
CLAMPING BLOCKS
FOR ADDED STRENGTH
COFFEE TABLE
43
23
20 TILES
39 TILES
2
4 1/2
1 1/2
3/4" PLYWOOD
9 1/2
3/4" SOLID WOOD
17 1/2
3/4
1 1/2
9/16
3
DETAIL E
DETAIL C
1/16" SPACE
DETAIL B
2 1/8
15 1/2
1 1/8
DETAIL A
17 1/4
5/16
3 5/16
1/2
14
8 1/4
7 1/4
15 3/16
3 5/16
3 3/8
16 1/4
21 7/8
DETAIL D
BEND ON DASHED LINES

holes for the swivel glides. *Do not* insert the glides until all of the finish has been applied to the legs. Mount bolts on 8 legs only.

18. The next operation is that of cutting the coffee-table legs into two parts so that when the table is assembled, it will appear that they extend through the shelf to the floor. Two cuts are necessary. First, measure up 10 in., from the bottom end of the legs and cut off squarely. This means that you will have to adjust the miter gauge and the angle of the blade to allow for the taper of the leg. Now measure down from the top end of the leg 5 in. At this point, an angular cut is necessary so that these parts of the legs will "line up" with the lower parts. Again, the blade and the miter gauge need adjustment. Space does not permit an exacting procedure, so allow for experimentation.

19. Mount the hanger bolts on the tops of both sections of each leg.

20. Fasten the lower leg sections to the table shelf. See drawing of the table for approximate location. Use just 2 screws for now.

21. Line up the upper sections of each leg with the lower sections and mark into place. They should be fastened to the shelf with 2-in. No. 12 f.h.b. wood screws. Here again, you are asked to develop your own procedure as an explanation by the writer requires too much space which would make the article too long. Refer to detail drawing *C*. NOTE: For greater screw-holding power, fill in the kerfs under the shelf at those points where screws entered the shelf.

22. Having fastened the upper leg sections into place and refastened the lower sections check for proper alignment. At this stage, you may have to turn the upper section slightly and then readjust the hanger bolt. I did this only by sight for all practical purposes.

23. Disassemble for the finishing operations. CAUTION: Make your identification marks on each leg part for proper assembly after finishing.

24. Apply a wood filler to all exposed parts if an open-grained wood is used.

25. Apply all necessary coats of finish to all surfaces excluding the plywood tops.

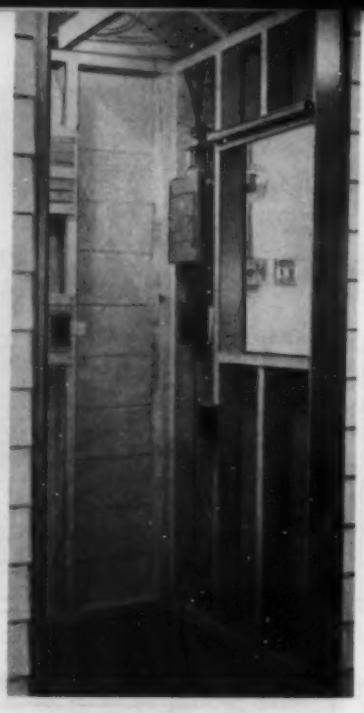
26. Make a paper pattern using 1-in. grid squares and then using tempera water paint, paint in the squares with the different colors to establish the design. This serves as a guide when placing the tiles.

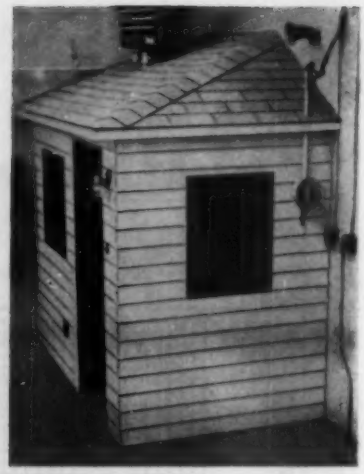
27. Apply the tile cement to one top at a time and place the tiles according to your pattern. Allow approximately 1/16 in. for grout.

28. Mix grout to a thick consistency and work well into the joints. Specific directions are available from your tile dealer.

29. Reassemble each table. Rub down all parts first, apply a coat of high-grade wax, and assemble.

30. If planters are desired for the end tables, refer to the detail drawing for their patterns. I used galvanized metal, soldering all joints and painting them.





A HOUSE-WIRING PROGRAM

J. RUSSELL KRUPPA
Industrial Arts Instructor
Bald Eagle-Nittany Area
Joint School System
Mill Hall, Pa.

So often we find a gloomy structure of raw studs, joists, and rafters which represent the house-wiring section in many industrial arts and vocational shops. To me such an unsightly structure takes much away from the whole program when actually it could add much educationally and aesthetically. Most houses are not wired until they have been completely framed in, sheathing or insulation board placed on the sides and a roof overhead, so why should the students work in a situation which is not true when the situation could be made authentic?

The little house which we have constructed has been the subject of much discussion. It has brought many compliments from both students and visitors at our school. During open house, a night when much of the students' work is displayed for the public, the little house is again a source of much discussion with the parents of our industrial-arts students.

I feel that such a structure along with a neat bright shop helps to motivate the students in keeping the place neat and clean and gives them a real feeling of pride knowing that they are a part of such an organization.

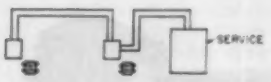
Naturally the initial cost of constructing such a unit is greater than it would be for a skeleton structure; however, over the years this little extra outlay pays for itself many times over.

This type of structure generally would not be made more than once or twice in a period of ten to twenty years but that one or two times will provide a very worthwhile group project for a class for part of a semester. Many truly worthwhile experiences are to be gained through such a project and the group chosen to do this work will be benefited more than one might realize. With such a unit much can be taught concerning the building trades and it can be a challenge for each student to apply his knowledge and display the skills which he has obtained and developed in his previous years in the industrial-arts course.

Once the house is completed it will remain as a permanent house wiring set-up and is always available for teaching purposes concerning building-construction techniques.

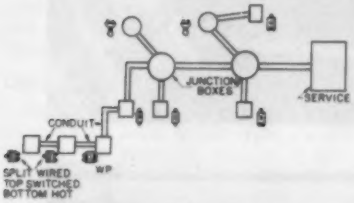
Construction Details

Our house is built into one corner of the shop. It is smaller than we would like but space is at a premium. The stud plates are anchored to the concrete floor with expanders and lag bolts. Here and there, the plates on top of the studs are anchored to the wall in a similar manner. Studding is placed on 16-in. centers as much as possible. No sheathing or insulation board was nailed to the studs and no windows installed in order to save money. Redwood lap siding is nailed directly on the studs. The rafters and joists are two-by-four's rather than heavier material to keep the cost down. Plywood is used for the roof and is covered with a lightweight grade of light-colored shingles.



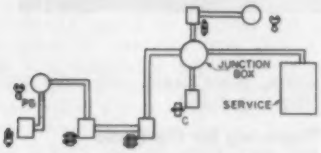
Circuit No. 1

(Small Appliance)
2 Hot receptacles
No. 12 Nonmetallic sheathed cable



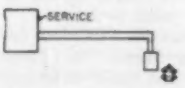
Circuit No. 2

(General Purpose)
2 3-way switches
2 Overhead lights
2 Single-pole switches
1 Weatherproof receptacle
2 Split-wired receptacles
No. 14 Nonmetallic sheathed cable
No. 14 Type R or T wire



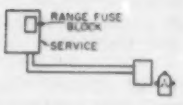
Circuit No. 3

(General Purpose)
1 Pull-switch wall outlet
2 Single-pole switches
1 Clock receptacle
1 Outside light
2 Hot receptacles
No. 14 Armored cable



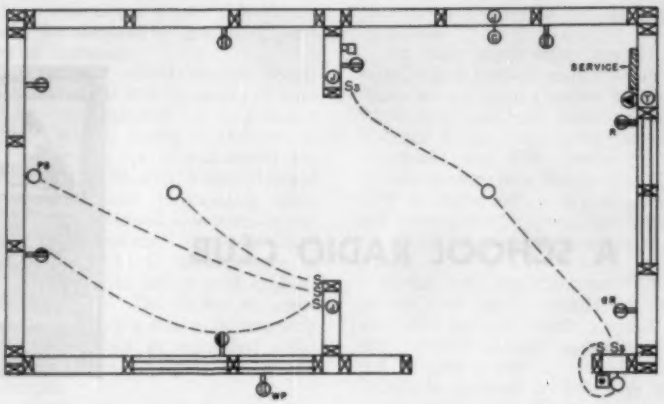
Circuit No. 4

(Laundry Receptacle)
Grounded
1 Grounded receptacle
No. 12 Nonmetallic sheathed cable



Circuit No. 5

(Special Purpose)
1 Range outlet
No. 8 Service-entrance cable



The house has two rooms each with a large light located near the roof. These lights are for illumination and are not touched during the wiring operations. Of course many modifications would be necessary to make a house suitable for the needs of individual programs, but this might serve as a very sketchy guide.

From four to eight boys can work on the unit together but with our crowded conditions four is ideal. Before beginning the wiring, a text is used to obtain the necessary information on wiring. We also study sections of the National Electric Code and other related material. Any good textbook could be used to obtain this information. We use the small paper-bound book, *Wiring Simplified* by H. P. Richter, for several reasons. First, it is inexpensive, a desirable factor when a department must operate on a small budget. Second, I encourage my students to build a personal library so that they will be better prepared to cope with problems which arise at home during their high school years and after graduation. Since we study this entire book thoroughly they become familiar with it and are more apt to refer to it than to a strange book. Also, a student is often more willing to purchase books for himself if the cost is not too great.

After studying the text and reference materials, we show the students as many different types of electrical devices as we have available and discuss other devices and the firms that manufacture such materials. They are also advised of the type material to avoid and how to purchase electrical equipment intelligently.

Departments with larger setups would have an opportunity to show and use many different types of devices in their programs. We have a rather wide variety for the small unit which we wire.

We next discuss the circuits to be contained in the house and teach the students individually and collectively to form the branch circuits. Dittoed sheets are used as a final source of information. These sheets are kept in the student notebooks and referred to as necessary during the wiring procedure.

Just before we begin wiring, the students are divided into two groups, each having a foreman. I choose the foremen on the basis of their ability as shown by the results of tests given while studying the text and learning the circuits. Their personality and leadership qualities are also considered. I have found that by dividing the group a spirit of competition exists which has proved valuable. Each foreman must be "on the ball" in order to answer the questions posed by his workers. Naturally each group tries to make as few mistakes as possible in order to prove themselves superior; therefore, each student is willing to do his job better. Those who appear to make mistakes often soon become cautious because of the pressures from their fellow workers. This spirit of competition also helps us get the same amount of work in less time due to the added efficiency of each workman.

We use the three most common types of wiring — conduit, armored cable, and nonmetallic sheathed cable. We mention other methods but do not use them. After the wiring is completed in the rough, all circuits are tested and changes made where necessary.

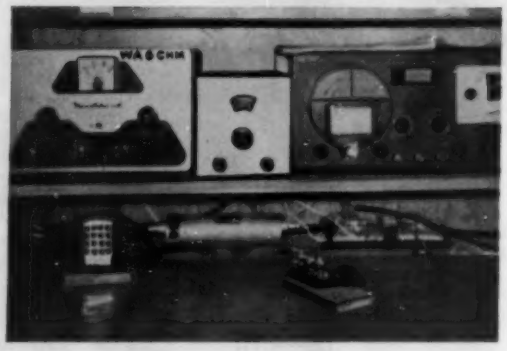
Parts of the walls are covered with plasterboard, rock lath, and wood lath to show some of the methods used. This also demonstrates to the students why it is important that boxes be placed at certain depths when roughing in the electrical work. It also provides them with the experience of making adjustments when installing the electrical devices; these are often necessary in order to make a first-class job.

After the whole house is wired completely we supply power to the service box and see how it works. This is always an intensely interesting time. There usually are doubts in many minds as to whether or not the lights will work.

After the house is wired the instructor can use it for some trouble-shooting experience. Many things can be done between classes to make the students sit down and study out the possible causes of the troubles you have provided for them.

A SCHOOL RADIO CLUB

KENNETH J. WEGER
Head, Industrial Arts Department
Clear Lake Union High School, Lakeport, Calif.



Several students in our high school approached me asking help toward preparing themselves for an amateur radio license. Being the shop teacher and having built several electronic devices along with teaching of general electricity within our regular shop curriculum, it was only logical that they should come to me for this help.

I recalled my own high school days and the radio club I belonged to and decided that perhaps such a club would be appropriate here in our own high school. I had some reservations stemming from the fact that our total school enrollment was just over 200 students and we could expect no money from the school for such extracurricular activities.

Organizing a Radio Club

We started the club with the three students who first approached me. We decided what should be required in the way of minimum radio equipment suitable for a good beginning radio station.

Our next problem was one of finances. We approached our local Lion's Club and presented our case to them extolling the virtues of such a radio "ham" station. We felt it would: (1) develop in young men an understanding of electronics that may well prepare them for a career in industry or science; (2) provide a good avocational outlet for youthful energy; (3) provide an emergency communications unit within a civil-defense network for the local area; and (4) develop a good background for the serious student who intends to further his education in the fields of mathematics, electronics, science, and communications.

We elected officers and held our meetings after school to lay our plans for building the equipment needed. We started practicing the code and theory required by the Federal Communications Commission for licensed radio operators.

Financing Equipment

The local Lion's Club donated the $200 we felt would be adequate for a beginning station. Once the basic station was set up further equipment could be built and bought with funds from club activities.

Our purchases were simple: namely, for $55 an S-40A Hallicrafters communication receiver with a Q multiplier for increasing the sensitivity of this receiver were obtained on the used "ham" equipment market, found in almost all cities; a Heath kit variable-frequency oscillator (VFO) and Heath kit DX-40 transmitter were purchased for under $100; and the balance of the original $200 was spent for a transmitting key, microphone, logbook, antenna material, etc. We added to this with parts gleaned from old radio sets and material from the shop for building our own transmitting antenna.

Kits were used wherever possible, not only because they were cheaper (about half of normal price) but because of the knowledge gained by the students in wiring and assembling such component parts. As time passes, equipment will be added to the original with student-constructed parts gleaned from local junk stores, other hams, and radio sets no longer operative.

Preparing for the Radio Operator License

While equipment was being assembled, code and theory practiced, we obtained pamphlets from the American Radio Relay League (ARRL), a nonprofit organization of radio amateurs located at West Hartford 7, Connecticut. These are available on request for help in establishing a radio club. These pamphlets helped us to conduct our meetings in an organized manner and to establish a set of bylaws similar to those used by other radio societies.

We found that the FCC does not issue radio-operating licenses to schools, but only to organized radio societies. Since the ARRL had already helped us in organizing our radio society we applied to the FCC office nearest our town for a regulation station license. Regulations required a licensed operator, holder of a general class license, to act as a station trustee. This was not difficult because by this time we had become acquainted with other "hams." A local student agreed to act as station trustee. He was in charge of all actual operation as to proper power and frequencies used on the air.

We called ourselves the "Cardinal Ham Messengers" (the cardinal being our school symbol), and, as luck would have it, we found that the last three letters of our call WA6CHM contained the proper initials for our club name. Our license with our call letters WA6-

CHM came through the mail about six weeks after we filled out the proper forms sent from the local office of the FCC.

In the meantime the radio club conducted radio-theory and code-practicing sessions after school, during lunch time, and during a once-a-week period when other students were in mass vocal.

The shop instructor conducted these sessions in an informal manner and along the advice found in the many publications of the ARRL on theory and practice necessary to pass the FCC examination.

Obtaining the Operator's License

To obtain the coveted "ham" license entails very little actual work on the part of the applicant since it is only necessary to pass a test consisting of some 20 questions on simple radio theory and FCC laws and a speed proficiency of only five words per minute. This is the basic requirement for passing the novice test which allows the licensee to operate on certain specified frequencies and affords him a chance to practice and gain additional speed and knowledge of theory for the more difficult but more desired general class license.

The novice license has been obtained by many youngsters while in the lower grades of the elementary schools as well as by oldsters in their later years of life. This license cannot be renewed and is only good for one year from date of issue. It is designed to help beginners to get on the air and become proficient enough within a year to qualify for the more advanced general class license which is good for five years from date of issue and is renewable thereafter. It is necessary to pass a written test of some 50 questions including diagram and circuit drawings and a code speed of 13 words per minute. This license affords the amateur a few more privileges of operation.

To obtain a school station license mentioned earlier it is necessary to have a general class operator act as a station trustee. Certified copies of the articles of incorporation, or organizational by-laws, together with FCC Form 610, and all other pertinent information must be filed with: Federal Communications Commission, Amateur License Division, Washington 25, D. C. It may take as long as two months before your application is processed. This is *not* an operator's license, only a station license such as would be used in organized radio societies with many operators in the membership.

To obtain an individual operator's and/or station license, the applicant fills out FCC Form 610, and sends for the test questions (if he lives over 75 miles from the nearest FCC testing center. Otherwise, he goes to the nearest FCC test center when advised to do so by appointment). The test is first on code proficiency, after which, if passed, the applicant may take the written multiple-choice questions on the class license applied for. If it is a test sent through the mail, a licensed amateur, holding the general class license at least one year and being 21 or older, must give the test and sign an affidavit. This folder is sent to the nearest FCC office since it is an application for an operator's license and not just a station license.

Club Activities

Outside of our regular meetings, during which theory and code practice is the rule, we have impromptu gatherings where the qualified amateurs may use the equipment, much to the delight of the newer members. Contacts are made not only within our own state but throughout the nation and even foreign countries.

We have made many contacts with other school stations similar to our own. Since we are using a rather low 75-watt transmitter and have made many long-distance (DX) contacts by phone (microphone) and CW (code) we have proven to ourselves that it is not necessary to have high-powered equipment and consequently high-priced equipment to obtain a high-class amateur radio station.

Within our own club, activities may include code speed contests, getting the most DX contacts within a certain time limit, and a hidden transmitter hunt, just to name a few.

Outside speakers on radio are always good interesting activities. Many questions are in this way answered and problems solved. Remember many of the advances made in radio today are the results from the amateur radio stations in their quest for better equipment.

Station Policy

Our school radio station is located in our school shop instructor's office, since he is the faculty advisor, and is built into the bookcase with a drop-leaf shelf which when closed is locked against unauthorized operation and when open acts as a working surface. The equipment fits into the space allotted in a compact neat array. The QSL cards (confirmations cards mailed out to each other to confirm radio contact) are neatly displayed over the wall area within the office referred to as the radio "shack."

It goes without saying that it is first necessary to have the approval of the administration before undertaking the steps necessary to erect an antenna on the school grounds and establish a radio station. The virtues of such a station are so educational that it is rather difficult for the author to imagine any possible opposition from the head office.

Our own school station is very well filtered and free from spurious radiations which might cause radio or television interference. This is necessary if proper public relations between school and community are to be preserved.

Publicity

Publicity for our school radio station has been taken care of by our local newspaper and newspapers in nearby communities. Many persons have been invited to see the station in operation by student operators. The officers of the radio club were invited to a dinner meeting of our local Lion's Club where the program for the evening included questions and answers on the why's and wherefore's of amateur radio. Afterward, the Lions watched a demonstration put on by the radio club and several talked over the "air" themselves. Many dubious persons who were not too sure that they liked this so-called "frill or fad" in our local high school changed their minds after listening to the young men talk higher mathematics and electronic jargon.

---------books for learning "more on radio"

There are many excellent books obtained from the bookstores, radio-parts catalogs, libraries, etc., that may be used to advantage in learning more about radio. However, books and pamphlets by the American Radio Relay League (ARRL), a nonprofit organization of radio amateurs, will be of more immediate value because of their pertinent information toward amateur radio rather than television and radio servicing from the commercial sense.

The Radio Amateur's Handbook. $3.50
The standard manual of amateur radio communication. Covers radio theory, construction, operation and designing of transmitters, receivers and antennas.

The Radio Amateur's License Manual $ .50
Questions and answers pertinent toward the passing of the FCC amateur operator license examination. Also, section covering the rules and regulation for radio-telephone operation.

How to Become a Radio Amateur $ .50
For the beginning student of amateur radio. Code-practice information and station operation are covered along with information as to equipment to purchase for setting up a minimum or optimum station.

Learning the Radiotelegraph Code $ .50
Suggestions for code-practice sessions with ideas on code-practice oscillator construction.

Hints and Kinks for the Radio Amateur $1.00

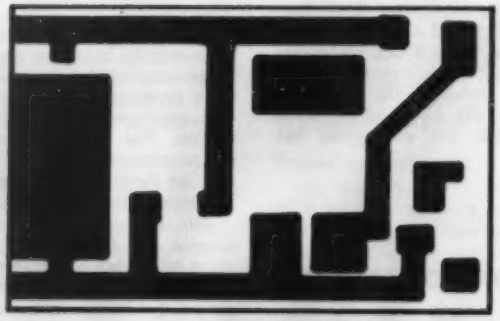
The ARRL Antenna Handbook $ .50

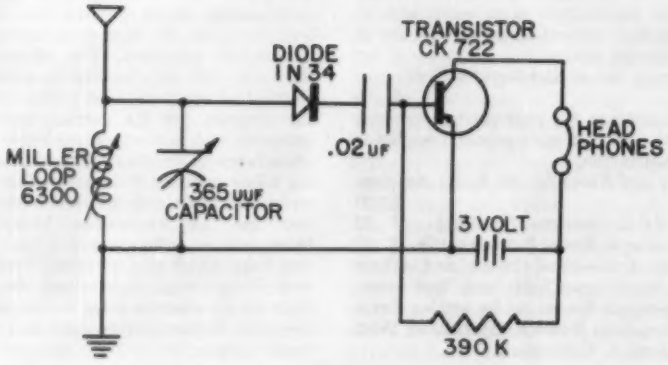
A Course in Radio Fundamentals $ .50

The above-listed books and others may be obtained from local bookstores, radio-supply houses, or by writing direct to: American Radio Relay League, West Hartford 7, Connecticut.

MODERN CRYSTAL SET FITS INTO YOUR POCKET

REX MILLER
Asst. Professor of Industrial Arts Education
State University of New York, College of Education, Buffalo, N. Y.





This one transistor etched circuit receiver has served many purposes in our classes here as it has gotten the students away from conventional methods of wiring and shown them there is something different in the new, mass-produced printed circuits. It is a stimulating project for more advanced students.

The germanium diode has replaced the old Galena crystal and cat whisker. No more does the student have to move the cat whisker around on an uneven surface to locate the best "spot" for reception. Modern diodes are soldered into the circuit and forgotten.

The nuisance of winding a coil on a form and tapping it for best reception is eliminated by a commercially wound one which is reliable for the whole broadcast band. No more wasted hours of checking connections and insulation as well as number of turns.

A miniature variable capacitor allows the builder to tune a station very accurately with the aid of the ferrite slug in the coil.

Transistors are available in over 200 different types each with special characteristics. Here a CK 722 (Raytheon) or 2N107 (GE) with an amplification factor of 20 is used to amplify the detected signal so it is a louder, clearer sound in the headset.

Printed Circuits

A printed circuit board eliminates the confusion of wires and adds experience for the builder. Most printed-circuit experience is on the repair side, but this experience of designing and etching a complete circuit presents a better understanding of printed circuits. Acid-resistant asphalt-base paint is applied with a small brush to paint over the copper portion to be left for use in the circuit. Ferric chloride in solution is used for the etching. The strength of the solution determines the time needed — *do not use metal containers for the solution, use glass.*

If you don't care to use the printed-circuit method, you can utilize the conventional method and wire the transistorized circuit for rewarding results.

Here is a project which can be taken home to show Mom and Dad how the industrial-arts department is teaching up-to-date methods of construction and fabrication as well as utilizing science in the printed circuit etching.

NOTE: Printed circuit "copper clad board" can be obtained from the Formica corporation for educational purposes. Ferric chloride is stocked in powdered form by most chemistry departments in high schools.

Parts List

CK 722 or equivalent
Pen-lite cells, 2 needed
Germanium diode, 1N34A
Resistor 290,000 ohms 10%
Capacitor, .02 Mfd., any working voltage
Tuning capacitor, 365 mmfd.
Miller 6300 Coil, Broadcast band
Headset, 2000 ohms
Plastic container, can usually be located at home
Battery holders, make to fit space — use tin plate

SIMPLE ELECTRICAL TESTER

ROBERT J. MOUSER
Industrial Arts Department
South Union High School, Uniontown, Pa.

A large difficulty that the teacher will experience in the high school electric shop is that the scope of worthwhile electrical projects is limited. This is partly due to the fact that electrical parts are costly and the facilities of the average high school are limited. The project too must be one that is worthwhile and durable. It should have a high degree of learning experience too.

The writer feels that this project will meet all of these needs as well as many more. Some of the advantages of this project are: (1) Few parts are required (*see* Bill of Materials), (2) The project is easy to construct but it is durable and useful, (3) Learning processes are evident, (4) The high degree of usefulness of this project will help to "sell" your program to the parents, (5) The student can use this tester to "trouble-shoot" many of the jobs that he will make later in the course.

Construction

Construction is simple since the body of the tester is made from a piece of ordinary dowel rod. If the electric shop is supplied with a metal lathe, the drilling can be accomplished on it. If no lathe is present, the dowel rod can be drilled on the drill press. The drawing will supply all necessary sizes except the socket hole and that will vary due to the variations of different manufacturers.

Wiring

The connection from the socket to the bolt head should be well made. It is suggested that the student twist the wire tightly under the bolt head and then solder it.

Safety

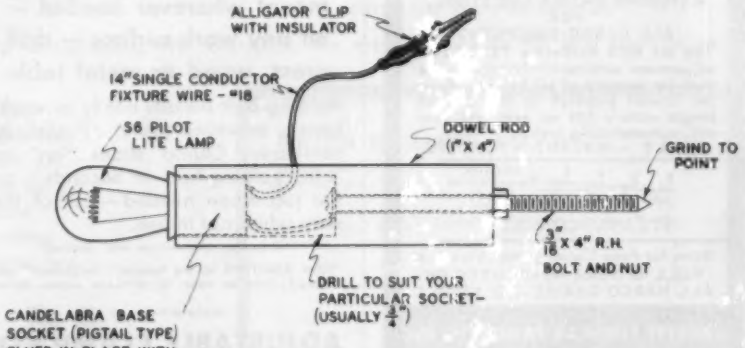
The tester is very safe to use since the ground clip is covered by an insulator and the dowel rod is gripped like a pencil. If even more protection is desired (although it is not necessary) a piece of insulated tubing called "spaghetti" can be slipped over the bolt and glued in position to merely leave the point exposed.

Finish

The dowell rod should be well sanded and given two coats of some good enamel for protection. The color choice is of no importance but this writer noted that the students in his shop are partial to red!

Bill of Materials

Quan.	*Name of Part*
1	Alligator clip (Mueller No. 85c)
1	Insulator for above (Mueller No. 87)
14"	Wire, insulated rubber-covered fixture —No. 18 ga.
1	Pilot lamp, S6, 110-volt (Candelabra screw base)
1	Socket, candelabra pig-tail type similar to Christmas tree type
1	Dowel rod, 1 by 4 in.
1	Bolt and nut —$\frac{3}{16}$ by 4 in. brass or steel (rh)
	Cement
	Red enamel


ALLIGATOR CLIP WITH INSULATOR
14"SINGLE CONDUCTOR FIXTURE WIRE - #18
S6 PILOT LITE LAMP
DOWEL ROD (1" X 4")
GRIND TO POINT
3/16" X 4" R.H. BOLT AND NUT
DRILL TO SUIT YOUR PARTICULAR SOCKET- (USUALLY 1/4")
CANDELABRA BASE SOCKET (PIGTAIL TYPE) GLUED IN PLACE WITH "DUCO" CEMENT

DOWEL ROD ELECTRICAL TESTER

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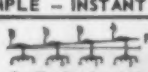

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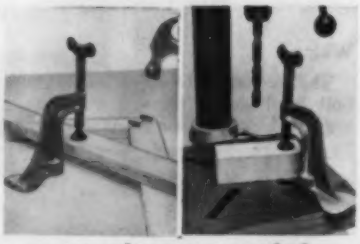
HOLD-DOWN CLAMPS*



mount wherever needed — on any work surface — drill press, wood or metal table

Holding-bolt installs easily in workbench, machine table, "T"-slot, or sawhorse. Clamp slides "on" or "off" holding-bolt in seconds — on the job when needed — out of the way when not in use.

write for information and catalog

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manufactured by

ADJUSTABLE CLAMP CO.

"The Clamp Folks"

424 N. Ashland Ave. Chicago 22, Ill.

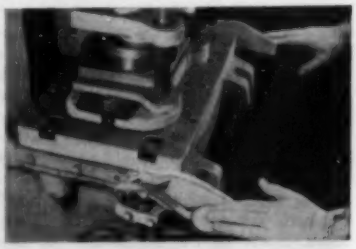
DIE STAMPING

(Concluded from page 27)

It is apparent from the photograph of the blanking die, that we had originally used an automatic feeding stop. We later discarded this, finding that hand feeding and locating was faster and more efficient. The die was also slightly redesigned for use in this article. The forming and embossing dies are shown just as we have built them for our use.

Materials

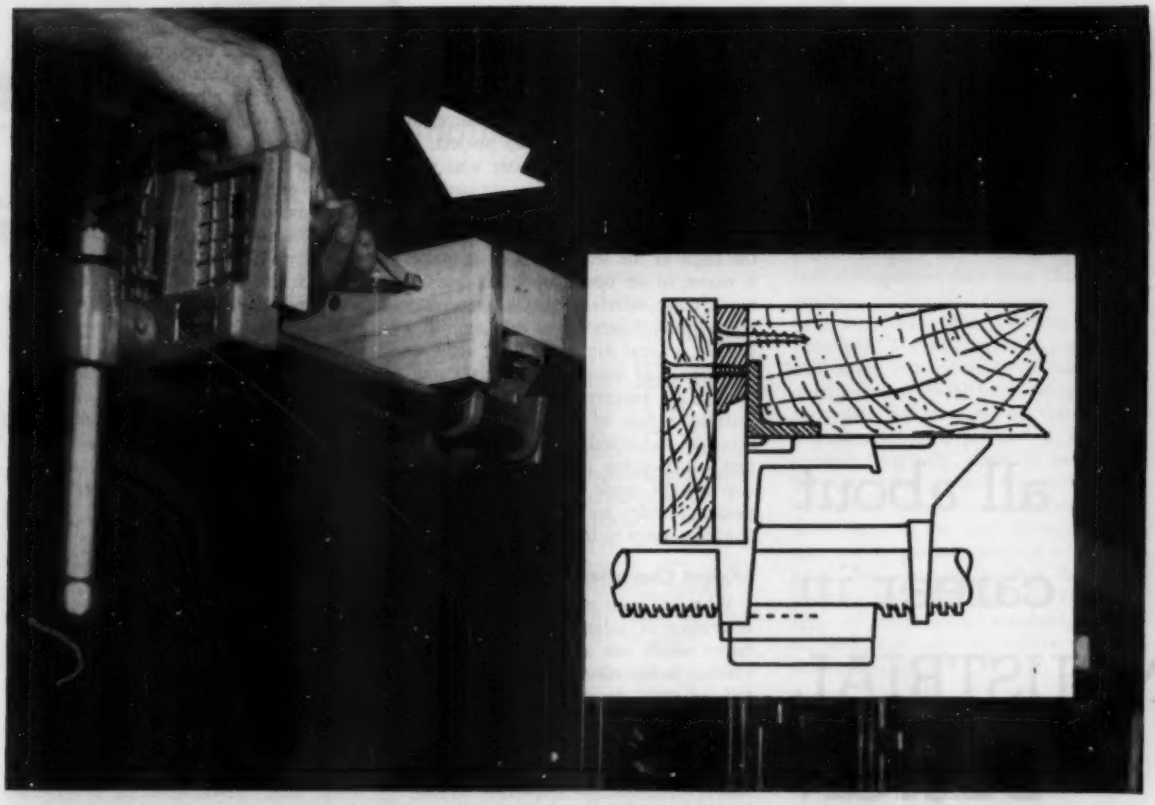
Stock for this ash tray should be 2SO aluminum sheet. This grade is soft enough to form readily yet will work-harden during the draw-forming to be hard and durable. Soft sheet copper of the same gauge (.32 in.) will also work out very well but it will be necessary to make a much tighter adjustment on the pressure spring. Care must be exercised on the initial adjustment of this buffer spring on all materials. The spring controls the gripping of the blank around the flat rim of the tray while the interior cavity is being draw-formed. The pressure ring which grips the blank prevents wrinkling of the rim while the cavity is being drawn. Pressure on the spring must not be so great that the metal of the blank cannot draw in radially to provide metal for the cavity.



Above: the two-button compressed air release for maximum safety. Below: completed tray (official name of school is now Oklahoma State University).

If the spring pressure is too great the blanks will draw too thin on the sides of the dish cavity and cracks will result in this area. This adjustment can easily be made by trial and error when the dies are set up in the press. If the blanks are wiped with light machine oil the draw will aiso perform better.

In addition to the great value of this project as a machine-shop problem there is also the opportunity to observe, first-hand, a number of the most common and most important principles in the pressworking of sheet metals.



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all about a career in INDUSTRIAL DESIGN

WARREN W. FITZGERALD

▶ the bright, growing world of the industrial designer; what he does, growth of his field, needed traits, and what a student should study to prepare him for this profession —

Among the thousands of young people studying in the industrial arts programs in American high schools, there are undoubtedly many who attract attention because of their reluctance to do a merely acceptable shop project. A case in point is the youngster who discovers that a change in the proportions of his coffee table makes it look better, or who finds that lowering or changing the angle of the seat on his chair makes it easier to sit upon, and thus finds it much more satisfactory. Oh there may be the perfectionist, who will refinish a project several times until it achieves the degree of luster he feels is important to its success. These examples illustrate a few of the attributes of a potential industrial designer. An important contribution to the industrial system can be made by discovering such young people and encouraging them toward careers in industrial design.

Student Characteristics

What are some of the individual characteristics of interest, personality, and talent which can aid an industrial arts teacher in the recognition of the potential industrial designer?

The first of these is an avid intellectual curiosity. This is often evidenced by the inability to accept things at their face value. Can the object in question be made to function better? Why was it put together the way it was? Could several elements of the project be combined into one, so that it can be made faster or easier, or appear more attractive? These are questions that give a clue to the possession of such a curiosity. Perhaps the student wants to do a project, but would rather do it his own way without recourse to a stock plan. Here is the trait of originality which marks a successful designer.

During the course of a team project, a student demonstrates a knack for working well toward its happy conclusion. He has strong convictions as to how things should be accomplished, but presents them in a way that is palatable to the other members of the team. And when it becomes apparent that he has to give a little to achieve the results he desires, he does it gracefully, is a good sport about it. This kind of youngster is basically well equipped to become a successful industrial designer.

And then there is the lad who seems to have an "eye" for the "look" of things. He is critical; he forms opinions about appearance. He may not be able to tell you why he likes one car better than another, but he knows he does. He feels it, and would be articulate about it if he knew how. He may like to draw, and covers page upon page of his notebooks with sketches of racy looking convertibles or jet aircraft, when he really should be doing his geometry assignment. Don't dismiss this one as a dreamer. Such dreamers have done a lot for our profession.

But maybe he can't "draw a lick" . . . Does he have a high degree of manual dexterity? He can be taught to draw in a surprisingly short length of time. Drawing, model building, and generally just putting things together are an important industrial design activity.

If a student possesses at least two of these attributes, he's likely to be as happy as a robin in a cherry tree working as an industrial designer . . . providing he likes to work. This, like any other worthwhile profession entails a lot of serious effort.

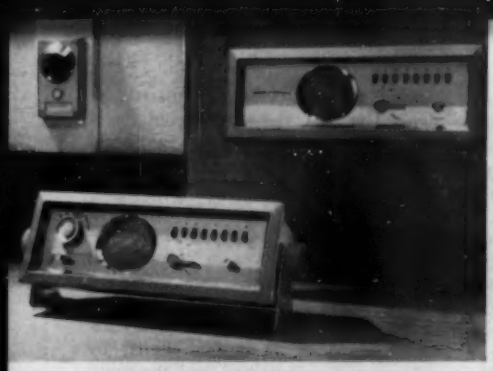
Mr. Fitzgerald is assistant professor and head of product design of the Institute of Design, Illinois Institute of Technology, Chicago, Ill.

Growth of Industrial Design

At the risk of oversimplifying a complex situation, it can be said that an industrial designer is fundamentally concerned with "what" to make, while an engineer is equally concerned with "how" to make. Certainly the activities overlap. Breakthroughs in technology have repeatedly made possible the creation of entirely new products. On the other hand, needs requiring satisfaction have stretched the creative talents of engineers to new heights of accomplishment. It is with these needs for human comfort, pleasure, increased performance, lower cost, or the general enhancement of environment that the industrial designer makes his contribution to society.

In the past, the question of "what" to make lay in the hands of the inventor or the manufacturer, who on the basis of initial success, looked around for new fields to conquer. Some time during the early 1920's, the manufacturer realized that he needed specialized help. This help was particularly required in the area of consumer acceptance. His first thought was to apply the talents of an artist to dress up or prettify his product. Fortunately for the American scene, the pioneer industrial designers soon convinced industry that the mere painting of flowers on a telephone was not enough to give it beauty. As in human beings, true beauty come from the inside out. In products, it is reached through the successful integration of all the elements in attractive proportions. Among the early projects undertaken were Raymond Loewy's redesign of the Coldspot refrigerator for Sears Roebuck, Henry Dreyfuss' work on the Bell telephone, and Walter Teague's efforts on behalf of the Eastman Kodak Company. Interestingly, the latter two associations continue to date.

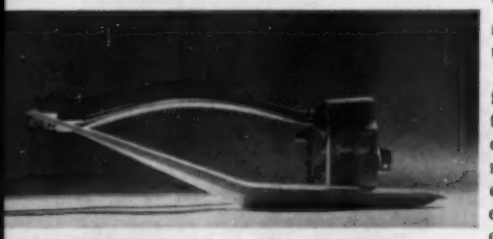
As the profession developed, designers



sample work of the industrial designer

(Cover illustration shows Professor Fitzgerald [right] and two senior students with examples of design problems.)

— Dave Chapman, Inc.,



grew in maturity, and through their ability to recognize the broad aspects of mass consumption, they came to enjoy a prominent and important place in the management function. Today, either in the role of consultants, or in internal staffs within large corporations, industrial designers are called in at the very inception of a new product. They often find their work carrying beyond the assembly line to packaging, and of late, even work with advertising agencies to insure the best possible presentation of the product to the buying public.

Contribution of the Designer

Many, many factors influence the shaping of the products available for purchase today. The first of these are, naturally, human needs and desires. A manufacturer who insists upon producing something which fails to invoke a favorable consumer response will soon find himself out of business. A designer performs the valuable function of understanding human beings, and evaluating their needs and desires. Unfortunately, this function cannot be reduced to an exact science, and most successful designers seem to possess an intuitive ability in this area. Recently, the tools of psychology, market research, and statistical analysis have been widely employed to assist in the determination of "what" should be made. There is still much to be learned about the effective utilization of these tools.

Technology and the ever present need for production economy are vital matters of consideration for the industrial designer. He is versed in the areas of materials and processes, and works with engineers and scientists toward more effective employment of these elements of production. However, the final decision of the specific details of this activity is usually the province of the engineer.

The patterns of distribution for any particular industry are extremely important to the designer, for they play a major part in the successful competition of the product in the marketplace. How the item will be sold, with regard to specific retail and wholesale outlets, cost considerations, seasonal demands, geographic and ethnic factors, must be understood if the designer is to do a complete job for his client. More and more the industrial designer is moving into the area of product planning, in addition to his actual design activity, to insure that the proper product is introduced into the market at the proper place, at the proper time, and at a competitive cost level.

Finally, we cannot ignore the one great difference that marks the unique contribution of the industrial designer, and distinguishes him from the market analyst, statistician, engineer, or management planner who specialize in these functions. The designer is a knowledgeable artist, who, equipped with an understanding of these many complex factors, can integrate all of their varied requirements and produce a beautiful product. Actually, there is no quarrel between esthetics and the demands of production, economics, marketing considerations, or the need for better function that a mature designer cannot resolve. He accomplishes this through a sensitive and often personal manipulation of mechanical elements, forms, textures, and color to achieve the best design solution.

Work of the Designer

At this point, the attainment of a successful design solution may seem insurmountable. Admittedly, it is a great challenge, and his lends a high degree of excitement to the activity. How does a designer go about it?

First, and quite important is the need to acquaint himself thoroughly with the client — and often his own management in the case of corporate designers. He must know what markets are involved, what production facilities are available, what competitive situations exist in the industry, and how the intended product will be used. All of these factors are essential to the understanding and clarification of the basic problem. Once this is established, he acquaints his staff with this information. Perhaps more properly, they acquaint him with the facts. Design today is largely a team activity and usually no one person can be accredited with a design solution.

The function of the product often receives the first consideration. Can it be made to perform in a more satisfactory manner? Just what should it do, or what human activity is associated with its performance? Early decisions here are critical. Many sketches, diagrams, and layouts are made, for the designer communicates among his fellows and clients graphically. On the basis of preliminary studies, usually involving mock-up models in clay, plaster, wood, cardboard, etc., several designs are selected for presentation to the client or management group. There is an increasing trend today toward making even initial presentations in model form, and

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this requires either the services of a professional model builder or accomplished modelers on the design team. Where possible, even the preliminary studies are developed in close coordination with engineering.

If the design team has done a good job, at this point one or more proposals will be accepted for further development. If new mechanical components seem indicated, engineering prototypes may be developed. Finally the day arrives for the final presentation. If all has gone well, the design is accepted by the client, such changes as are necessary are incorporated, and the infant product is turned over to production engineering for tooling development. Usually the designer furnishes the model, mechanical layouts, contour drawings, and any other material necessary for the successful translation of the design into workable instructions for tooling. If the designer has established an ideal relationship with his client, his responsibility does not end at this point. He is in constant consultation during the progress of the product until the pilot runs come off the assembly line. The specific procedures vary from office to office and within different industries, but this represents a general pattern of design activity.

The industrial designer has been called the champion of the consumer in the marketplace. Actually, he has a dual responsibility: a trust to society as a whole, and a loyalty to the best interests of his client, the manufacturer. Where these interests appear to conflict, he has the duty to resolve such conflict. It might be said then, that the goal of the industrial designer is to apply his knowledge and skills derived from experience and training toward the production of better products with resultant profit to the manufacturer.

The profession of industrial design is now some 30 years old. While it is an infant, as professionals go, its history in the past three decades has been one of accelerated growth in effectiveness and responsibility. Its future is exceedingly bright. With the advent of widespread automation will come an intensified need for thorough and exhaustive planning of new products. Tooling costs are high today, but the increase in these costs will be phenomenal when whole factories or industrial complexes are tooled and integrated for the conversion of raw materials into finished products. Only the type of planning and design assistance provided by the industrial designer can insure a successful program. Obviously then, the great need for young designers entering the profession will be great. These young people are now in the elementary or secondary school systems, or are yet to be born.

How to Prepare

How does a young person prepare himself for a career in industrial design? The first thing he should do is to develop an awareness of the world around him, and augment this with a genuine concern for the welfare of people. Then he should educate himself, at least through the university level. Today, few design offices or corporations will hire beginning designers without a college degree and a major in industrial design. Fortunately, there are many excellent curricula in design offered by colleges and universities, and the number is growing. The best of these programs develop in the student a high level of the professional skills, and back this up with a study of the humanities, liberal arts, engineering fundamentals, and esthetics. A prospective student should be skeptical of a program which espouses any of these to the exclusion of the others, for a well rounded person makes the best designer. It should be said that the better schools all provide a background in the techniques of design, and then offer an emphasis on that aspect of industrial design they deem most important. For example, in the Institute of Design at Illinois Institute of Technology, we place particular stress upon the experimental and creative approach to problem solving.

The post-Sputnik pressure to develop crash programs in scientific studies may discourage some students who are not so inclined. The preparation for a career in industrial design requires a basic grounding in mathematics, physics, chemistry, and mechanics, but does not demand the intensive development of such knowledge. Thus the student who likes scientific studies, but tempers this interest with enthusiasm for the arts, communicative, cultural, and social skills may be delighted with the study of design.

It is only fair to say that industrial design is no exception to the rule that all human activity is accompanied by frustration. The highly individualistic, creative person may find it difficult to work in team activity. Indeed, he may not be able to cope with the compromise of a cherished idea or the possibility of its downright rejection. He might prefer the totally intuitive solution of problems to the logical approach required in design, and would be better off in the field of fine arts.

The person who is happy working with others toward successful blending of specialized skills, who possesses the ability to give and take in social intercourse and business activity without becoming antagonistic, or otherwise disturbed will likely enjoy being a designer. As he matures and develops, he will be given increased responsibility for supervision and decisions, and will find himself working with the highly successful people at the top levels of industrial management. He will in most instances be well paid for his efforts.

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new / books

General Drafting

By Verne C. Fryklund and Frank Roy Kepler. Cloth, 204 pp., $3.40. McKnight & McKnight Publishing Co., Bloomington, Ill.

This book was prepared for anyone desiring to learn the fundamental practices of general drafting. It contains visual and written instructions and problems covering both the principles and the fundamentals of drafting.

Instructional units are grouped by the requirements of the problems which are to be drawn. The problems have been presented and numbered in order of complexity so that any system of problem assignment or numbering that a teacher may use in assigning problems to cope with individual differences may be adopted.

Ferrous Metallurgy

By Joseph S. Umowski. Paper, 83 pp., $2.25. American Technical Society, Chicago 37, Ill.

This laboratory manual contains background information, general theory, and explanations of steps in the presentation of laboratory experiments.

It is intended primarily for those who require more than textbook information on the heat treatment of steels. It should also be of value to technical personnel who have had little or no investigative experience in a laboratory, and to instructors and students at vocational and technical high school and technical institute levels.

The Unit Method

By Roy O. Billett, Donald Maley, and James J. Hammond. Paper, 21 pp., 25 cents. Published by the American Industrial Association, Inc. Copies may be purchased from The National Education Association, Washington, D. C.

This is a pamphlet to serve as a guide to the teacher in using the unit method of teaching subject matter. It is divided into three sections: The Unit Method; Research and Experimentation in the Junior High School; and, The Unit Method of Teaching at the Junior High School Level.

Teaching Industry Through Production

By George R. Keane. Paper, 29 pp., 25 cents. Published by American Industrial Arts Association, Inc. Copies may be purchased from The National Education Association, Washington, D. C.

This is a pamphlet describing a practical, simple method of achieving a few of the illusive industrial arts objectives now believed in by many teachers. It can serve as a guide in teaching organization for production by dividing and organizing the class to make organization plans and find project ideas, and, after production, class discussions and evaluations on the work done.

Practical Shop Mathematics

By John H. Wolfe and Everett R. Phelps. Cloth, 354 pp., $4.75. McGraw-Hill Book Co., Inc., New York 36, N. Y.

This second volume of *Practical Shop Mathematics* is a result of revision to comply with today's need for designing the more complicated jigs, fixtures, gauges, and machines necessary to machine several operations of a single part simultaneously.

Chapters include: solid trigonometry or compound angles; compound angles applied to the mounting of parts on adjustable angle plates; screw threads; gears; planetary gearing; and combining fractions and continued fractions.

Television Servicing Information

Compiled by M. N. Beitman. Paper, 192 pp., $3. Supreme Publications, Highland Park, Ill.

This manual is a series of drawings illustrating most-often-needed 1960 television servicing information. It includes circuits, waveforms, alignment, voltage charts, service hints, and changes.

Low-Frequency Amplifiers

Edited by A. Schure. Paper, 79 pp., illus., $1.80. John F. Rider Publisher, Inc., New York 11, N. Y.

This book is Volume 30 in the Electronic Technology series edited by Dr. Schure and deals with the audio frequency band between 20 cps and 16,000 cps. The book clarifies the application of vacuum tubes as well as transistors to audio frequency amplifiers. Special emphasis is given to considerations underlying the design of systems, showing and solving specific design problems. This book will be of particular use to industrial laboratories, schools, students, technicians, experimenters, and hobbyists.

How to Design and Install Plumbing

By A. J. Matthias, Jr., and Estes Smith, Sr. Cloth, 446 pp., $4.95. American Technical Society, Chicago 37, Ill.

This revised, fourth edition incorporates the latest developments of the plumbing trade. The organization of the book and the explanations help to eliminate guesswork in planning and constructing plumbing installations. Such specific problems as those connected with automatic systems, rural water systems, soda fountains and bars, hospitals, and water softening systems have been considered.

The illustrative example covering the design and installation of plumbing in a modern six-room residence has been retained. A complete set of specifications and a set of blueprints are included with this example.

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personal / news

DR. BAWDEN DIES

▸*William T. Bawden*, formerly head of the department of industrial education at Kansas State Teachers College, Pittsburg, and subsequently director of publications, died on April 27, 1960, at Santa Barbara, Calif. Upon retirement from these duties in 1950, Dr. Bawden lived in California.

His teaching career included one year, 1896–97, as teacher of common branches in a secondary school in Osage, Iowa; six months in 1898 as instructor of wood turning and patternmaking in the New York State Reformatory, Elmira; four years, 1898–1902, as instructor of industrial arts in grade schools and high schools in Buffalo, N. Y., seven years, 1903–10, as head of the department of industrial arts, Illinois State Normal University, Normal; two years, 1910–12, as assistant dean of the College of Engineering, University of Illinois, Urbana; nine years, 1914–23, as specialist in industrial education in the U. S. Office of Education, Washington, D. C., the last four years as assistant commissioner; five years, 1923–28, as associate superintendent of schools, Tulsa, Okla.; seven years, 1928–35, as managing editor of *Industrial Education Magazine*, Peoria, Ill., of which he served also as part-time member of the editorial staff for 30 years, 1909–39; ten years, 1935–45, as head of the department of industrial education, Kansas State Teachers College, Pittsburg; and for the next five years, director of publications.

Dr. Bawden was the author of "Leaders in Industrial Education," a compilation of biographies first published in IA/VE.

Awards . . .

▸*Chris H. Groneman*, head, industrial education department at Texas A. & M. College, College Station, Tex., was named industrial education "Man of the Year" on April 22, 1960.

He was selected for his service to industrial arts education as a teacher and supervisor, and for the honor and recognition he has brought to the industrial education profession.

The award was made by The Ship, an organization of representatives of reliable firms doing business in the education field.

The presentation was made by William MacLachlan, manager, School Sales, Rockwell Manufacturing Company, during the American Industrial Arts Association Convention.

Retirements . . .

▸*Claude William Horst*, supervisor of the Industrial Education Laboratory at the University of Washington, Seattle, will retire at the close of the Spring Quarter of this year.

He started his teaching career by teaching woodwork and mechanical drawing at Anaheim, Calif., in 1919. He then taught woodwork, mechanical drawing, and auto mechanics at Hilmar, Calif. From 1924 to 1928 he taught drawing and sheet metal at Tacoma, Wash. From 1929 to 1942 he taught sheet metal and mechanical drawing, machine drawing, boatbuilding, and auto mechanics at the Milwaukee Vocational School, Milwaukee, Wis. From 1949 to the present he has been supervisor of the Industrial Education Laboratory at the University of Washington.

In addition to his years of service as an educator, Mr. Horst spent about two years as a marine engineer; he was superintendent of the Coastline Ship-Building Company at Tacoma, and superintendent of the Fox River Boat Works, De Pere, Wis. He has also served as a naval architect with the Kargard Boat and Engineering Co., Marinette, Wis., and the Hilbilt Boat Co., Madison, Ind.

▸*Francis W. Dalton*, professor of vocational education and practical arts, at the University of Michigan, Ann Arbor, will start retirement furlough in July.

Dr. Dalton has a lifelong history of service to education in Michigan. In 1909–10 he taught in the Leelanau County public schools. He served as superintendent of the Ionia County public schools from 1917 to 1919. For 10 years thereafter, he was director of Continuation School in Ionia.

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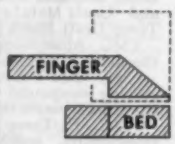

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THE AIAA IN TORONTO

For the first meeting held outside the United States, the 22nd annual convention of the American Industrial Arts Association appropriately considered the theme, "International Understanding: Implications for Industrial Arts Education." The meeting was held April 19–22 at the Royal York Hotel in Toronto, Ontario, Canada, under the direction of president Raymond M. Karnes, University of Illinois, and executive secretary Kenneth Brown.

The Three Main Sessions

Relegating the problems caused by the eroding of industrial arts hours to other areas of the local district curriculum to a secondary status on the program, the AIAA convention developed its theme in three major phases:

1. John H. Furbay, director of the International Association for Air Age Education, keynoted the theme by defining one basic fact: the international situation "is changing fast."

A dramatic illustration of this is Africa's coming generation of civilizing which took Europe ten centuries to accomplish. The harnessing of air for transportation and communication, unlike the development of the sail or the wheel, has destroyed isolation and exposed two-thirds of the human race still uncivilized to such a high degree of civilization at such an instant to produce "a creative burst" of civilization on the continent.

Dr. Karnes receiving the ACIATE award from Wm. Tierny of Maryland.

Another example of our contemporary international picture's "rapid change" is the statistic that 55 per cent of the jobs performed today in the world did not even exist 50 years ago. Even new industries, like aviation, have undergone and are undergoing "enormous revolutions."

The implications of this change in the world means that industrial education "must technically train our children to meet the dramatic advances of our age."

Dividing into six symposiums — each

for teacher educators and supervisors

Two groups, meeting prior to the AIAA considered sidelights of the main theme:

Teacher Educators

1. The *American Council on Industrial Arts Teacher Education* heard representatives of the Office of Education (Dr. Oliver J. Caldwell, assistant United States commissioner for international education, on "The key to future international relations and its implications for teacher education"; Dr. Thomas E. Cotner, director of the education exchange and training branch, division of international education, on "Some Expectations of Personnel from Abroad Who Visit Our Schools") discuss factors of "Promoting International Understanding Through Teacher Education."

The group also discussed its ninth yearbook, "Research in Industrial Arts Education." Accepting the yearbook from Wes Stephens of McKnight and McKnight, Bloomington, Ill., was the yearbook editor, Dr. Ray Van Tassel New York University, whose introduction expressed concern of the yearbook committee over "the lack of scientific research being done in industrial arts education throughout the country."

The "Man-of-the-year-in-teacher-education" award was presented to Dr. M. Ray Karnes, AIAA president. Dr. Donald Maley, University of Maryland, was elected president of the group for a two-year term, beginning July 1, succeeding John A. Fuzak, Michigan State University.

Supervisors

2. The *American Council of Industrial Arts Supervisors*, met with the ACIATE to discuss aspects of its theme. "Promoting International Understanding Through the Role of the Supervisor."

Apart from the international education and industrial arts motif, a five-group discussion session on "Educational Leadership in Industrial Arts Education" pointed up the need for a "supervisors' handbook" to bring about a better understanding among teacher educators, teachers, and supervisors for the ultimate improvement in industrial arts education. Another session considered "Educational Leadership Through Industrial Arts Education" with five groups thrashing out "standards for industrial arts" in the area of scope and sequence of course descriptions, etc.

In his opening remarks to the group, M. J. Ruley, Tulsa, Okla., supervisor of industrial arts, accused the educational profession and lay public of becoming "Conantized." He pointed out Conant's difficulty with terms has caused a confusion as to what vocational education, industrial arts, etc., really are and their place in the curriculum. "I believe we need to explain the purpose of industrial arts in a straightforward manner."

(For more information from advertisers, use the postcard on page 57)

with five sub-topics — conventioneers discussed ramifications of global economics, geography, vocational opportunities and industrial arts, understanding the problems of other peoples, races, etc.

2. Allan Jarvis, editor, *Canadian Art*, former director of the National Gallery of Canada, defined with the aid of slides "International Influences of National Design: Implications for Industrial Arts."

"To become visually literate is the aim of the 20th century," he stated, explaining that today's citizens are interested in so many things they often overlook the "things they see" everyday . . . the realm of art and design in schools, city architecture, etc.

Relating this need to education, Dr. Jarvis pointed out the necessity for visual education in schools, i.e., teachers having the opportunity of teaching students to "see" or assimilate the images of our center reflected in furniture or even an everyday coffee pot. "The 20th century begins a new renaissance. This renaissance has been keynoted by art assimilating science. Space and space organization is the image of our times. Now it is the teacher's job to assimilate these 20th century images and teach students to 'see' with broader perception."

This session's six symposiums answered such salient offshoots of this topic as: Should a teacher of the practical arts apply specific national designs in student projects? Assuming that esthetic freedom, or the enjoyment of the seven arts, is a mark of maturity, how can it be implemented in the classroom?

3. "Is Education Justified in Promoting World-Wide Industrialism?" was the question raised in an animated debate moderated by Burl N. Osburn, State College, Millersville, Pa. In the debate, three affirmants pointed out that industrial education is unique in being able to interpret and advance the needs and benefits of industrialism by educating today the adults who will benefit tomorrow from extending industrialism; the dissidents noted industrial education's difficulties in presenting the concept of industrialism when the very core of the subject is development.

The convention's smooth-working machinery and professional program was evidence of hard work by AIAA officers (and representatives of the Ontario Industrial Arts Association); and while the convention's lofty program was quite professional and inspiring, the real gain by many convenees was found in the informal and impromptu "bull sessions" at the lunch and dinner tables and in the lobbies on "What Troubles Industrial Arts in Our Space Age!"

Other Features

One of the most popular facets of the meeting was the "student demonstration" program in which representatives of the industrial education division of the State University of New York College for Teachers in Buffalo demonstrated silk screening of decals, electronic printed circuit making, etc.

A special meeting with the AIAA National Safety Council Joint Committee heard Denis J. Kigin, Arizona State University at Tempe, discuss changing aspects of "Tort liability affecting shop teachers." Drawing from his research in this vital area (for details of Kigin's dissertation on the subject, see page 54 of your IA/VE for May), Dr. Kigin brought to light the position that the shop teacher occupies with regard to liability. Although the concept of tort immunity may shift slightly within the next few years, the need for the shop teacher to act in a prudent manner and develop a "safety attitude" will still be very important to fulfill the expectations of courts in tort liability litigation.

Following the annual banquet, the Ship under deck officer W. E. MacLachlan of Rockwell Mfg. Co., Pittsburgh, sponsored the traditional entertainment. Over 70 firms in 110 booths displayed the latest variety of equipment, tools, and supplies needed to conduct the modern industrial arts program.

The new officers include: Ivan Hostetler, North Carolina State College, president; M. J. Ruley, Tulsa, Okla., schools, first vice-president. William J. Wilkinson, Wallingford, Pa., and John A. Fuzak, Michigan State University, will continue as second vice-presidents.

The 1961 AIAA convention will be held April 4–7 in the Chase-Park Plaza in St. Louis, Mo. — *E. J. P.*

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peculiar to the lessons. In the science laboratory the materials may involve magnets, iron filings, grasshoppers, frogs, wood sections, pulleys, lenses, and chemicals. In our laboratory (workshop) our materials include paper of all kinds, metals, woods, plastics, stone, finishing materials, abrasives, and a host of others. In science, the laboratory "experiment" can be limited to an exercise, and upon its conclusion the materials and equipment put away and the report written up in the manual provided for that purpose. We too *can* limit our shop work to the equivalent of joints and exercises or we *can* develop the concepts we desire through construction of items of utility and beauty. The students' booth in a science fair is the equivalent of a "project" in our shop. Both science and industrial arts can involve problems in design, planning, construction techniques, balance proportion, lettering — resulting in an effect that is at one time useful and beautiful and saturated with the "stuff" of learning, the result of thinking. In terms of the individual, it *can* be original.

Recently man went under miles upon miles of ice by means of a "thing," made of *materials*, by superskilled hands. The original creators of that "thing" and its instruments, had to have had experience with materials and a knowledge of what they would or would not do, as the "thing" developed. Again the interaction of ideas and doing. Our workshop is a place where similar ideas take form.

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Yet there are those today who see us as teaching *only* technical skills. They have no idea of the endless hours we spend attempting to build concepts of design — balance, proportion, dominance — along with an understanding of the problems of color. Our critics have never seen a high school class in mechanical drawing struggle to read the ordinary divisions of a 12-inch rule during the first week they are with us. But we are expected to carry them through to machine design and architectural drawing in from two to four semesters because "handwork is easy, a technical skill."

In order to have others understand the contribution our field can make to the general education of all, to have them see its disciplinary values, we must first understand it ourselves. Readings in anthropology and the history of man's development clearly show that what we now call the industrial arts has always been with us. Man's history is the history of discovery and invention — the discovery of materials and what they would do, and invention for their use. Science was a natural outgrowth of this process as man recognized principles and laws and named them. What is now the field of plastic and visual arts has been ever present as man designed and decorated his tools, weapons, and utensils. Facetiously we might add that home decoration started on cave walls, though that was probably not the purpose at the time. Development and progress have come because of need. Man met those needs with stone in the stone age and bronze in the bronze age. Today we have passed through the industrial revolution and live in a world of advanced science, push buttons, and automation. But the need for teaching basic fundamental lessons and skills has not disappeared. Man is not born possessed of the principles of relativity and atomic fission. And for every "chief" who later grasps that understanding, we must still have ten thousand "indians" to carry out subordinate responsibilities.

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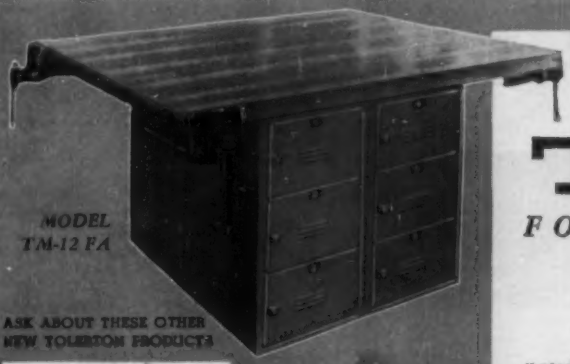

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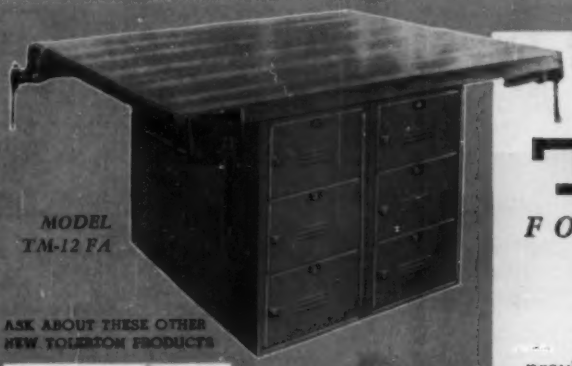

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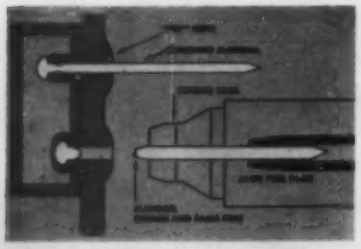
"Pop" Rivets are high strength, precision-made hollow rivets assembled on a solid mandrel. They are especially useful for "blind" fastening — where there is no access to the reverse side of the work. For "nonblind" applications, they provide a new convenience in fastening which affords savings in design, production, and assembly costs.

They are made in various sizes and types in aluminum, monel, copper, and steel. Two basic types are available: open-end and closed-end.

Because of their unique design, "Pop" Rivets provide a new concept in fastening convenience. They provide improved fastening flexibility, whether used in the making of planes, missiles, metal furniture, toys, boats, roofs, gutters, signs, ducts, cabinets, or in the construction of buildings.



United "Pop" Rivets

Their advantages are: they help eliminate subassemblies and reduce assembly costs; they often provide the opportunity to use thinner sheets without distortion, fastener stripping, or loosening; as many as 1200 can be set per hour by unskilled help; wide grip range simplifies inventory. Because they set by compression, they work equally well on plastic-to-metal fastening. They can be applied at any point on the assembly line with lightweight, inexpensive setting tools.

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For further details on numerous other unique features of these rivets, please write to the manufacturer.

(For further details encircle index code 0601)

PORTABLE SCIENCE UNITS

The Tolerton Company have introduced their Portable Science Units, Model TPSU-100, which comes equipped with ¾-in. duralumin rods, stainless steel sink, pressure faucet pump, propane burner and fuel tank. The Portable Science Units offer versatility and functional use unequaled in

Portable Science Unit

elementary and advanced science classes. Three hi-impact styrene tan tote trays, measuring 13⅝ by 18⅞ by 4⁹⁄₁₆ in., each, are also part of the unit.

Two 2-gallon polyethylene bottles with tygon hose connections and a three-pronged electrical duplex receptacle with rubber-covered extension cord are included for additional safety.

This unit is compactly built in a 24 by 48-in. birch cabinet with two sliding doors and aluminum pulls. Plastic top — 28 by 54 in. — gives ample working area. Three shelves provide additional storage space. Four 4-in. hard rubber casters, two stationary and two swivel locking type, allow this unit to be moved from one working area to another and locked in position.

Portable Science Units are shipped knocked-down, and are easily assembled for instant use.

Further information available from The Tolerton Company.

(For further details encircle index code 0602)

MILLERS FALLS TOOLS

New offerings in the Millers Falls Company Tooltime Sale are the Nos. 830 and 840 Belt Sanders — 3 in. ¾ h.p., and 4 in. 1 h.p. These are powerful, rugged new tools designed for heavy-duty service and incorporating 16 special features.

Millers Falls Tools

Other bonus offers in the Tooltime Sale event this spring and summer are: three heavy-duty portable electric saws, 8¼ in., 7¼ in., and 6½ in.; the No. 360 jig saw; the No. 626 Standard Duty 6½-in. saw; No. 8006 Power Bit Set; Nos. 900 and 75 Planes; No. 1200 Combination Square; No. 1237 Hacksaw Frame; and No. 692C Tubular Steel Claw Hammer.

For further details on the special prices and bonus offerings in this special 1960 sale, write to the manufacturer.

(For further details encircle index code 0603)

SKIL UNIVERSAL SAW TABLE

Skil Corporation have introduced their new Universal Saw Table, Model 528, which converts most skil right-hand blade saws into a bench type circular model.

Skil Universal Saw Table

Special features include an adjustable, clear plastic deflector to protect the operator from sawdust or wood chips; miter guide to make cuts from 45 to 90 deg., left or right; adjustable rip guide to make rip cuts up to 10¼ in. wide; and an on-off switch located conveniently at the side.

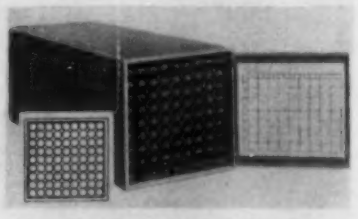
The new Universal clamping device quickly locks 10 Skilsaw Models securely in position. Capacity is ³⁄₃₂ in. less than cutting depth of saw used.

Now available either at retail stores where Skil Tools are sold or from Skil industrial distributors.

(For further details encircle index code 0604)

NEW SIZE STAKTUBE ROLL-FILE TUBES

Stacor Equipment Company, manufacturers of Lifetime Quality drafting room, school and library equipment, have introduced the new 81-tube Staktube File for quicker filing-and-finding of rolled prints, maps, charts, etc. The space-saving Staktube Files are now available complete with 81 steel-rimmed 1½-in. ID tubes, expanding to 32 the number of Staktube sizes: 9, 16, 36, and now 81, each in eight different lengths from 18 in. to 60 in.



New Size Staktube Roll-File Tubes

The new tube size combines maximum space utilization with maximum protection, keeping individual drawing neat, clean, and in order, and preventing mutilation from unnecessary handling in use, in transit, and in storage. Drawings are located quickly by using the file's outside label and complete index record on the inside of the hinged door.

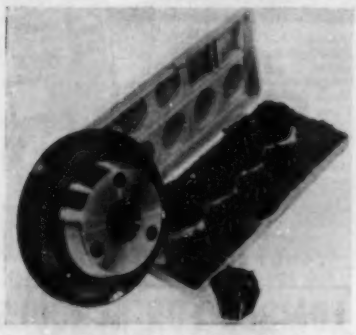
Precision made of heavy gauge steel and finished in hard-baked gray enamel, the Staktube files may be stood on end, or stacked horizontally to any height.

Catalog sheet and prices for the new 81-tube size, as well as complete information on the entire Staktube line, are available from Stacor Equipment Company.

(For further details encircle index code 0605)

NEW HANDWHEEL OPERATED NOSE TYPE COLLET CHUCK

A new development in collet chucks for lathes is now offered by The Jacobs Manufacturing Company. Known as the Model 50, it has a handwheel-operated, nose-type closure and "Rubber-Flex" collets. It offers the user complete collet chucking at purchase price savings up to 71 per cent.



Jacobs Model 50 Collet Chuck and set of ten "Rubber-Flex" Collets

The design of the Model 50 chuck promotes safety because of its easy, handwheel locking and its lack of appendages; and that it permits supply economies due to its ability to chuck any diameter bar between the ranges of .100 and 1.063.

Other advantages of the new Model 50 Collet Chuck are: easier, faster collet changing; capacity increases up to 42 per cent; runout of no more than .001 in. at the nose; a range of .100 in., twenty times that of conventional collets; more than enough gripping power for heaviest duty cutting on light lathes; and direct spindle mounting without need for threading adapters.

The Jacobs Model 50 Collet Chuck is available from industrial supply distributors throughout the country.

Further information available.

(For further details encircle index code 0606)

NEW 14-IN. TILT-DISK SANDER

Yates-American Machine Company have incorporated in their new 14-in. Tilt-Disk Sander, new design features to achieve new ease of operation and greater accuracy and safety. New features formerly found only in larger, heavy-duty equipment provide rigidity and power for producing accurate, quality finishes on wood, plastic, or metal.

The major feature of this new sander is the unitized tilting disk assembly which combines the direct motor drive, sanding disk, and safety guard, allowing the use of a stationary worktable. The worktable always remains flat and level, eliminating awkward work handling on a tilted surface. Heavy work pieces are easier to hold in position for greater accuracy and operating safety.

The Tilt-Disk Sander

Easy, accurate finishing of curved or irregular shaped work pieces is provided by the wrap-around stationary table. It has an extra large machined and ground work surface 20¾ in. wide with 9½-in. edge-to-disk depth, 3 in. beyond the disk on each side, and wrap-around surface 5⅛ by 3⅝ in. behind the disk.

Precision adjustment within the wide range of disk tilt from 15 deg. forward to 45 deg. back is easily and quickly made with the handwheel located in the front of the machine. The degree of tilt is indicated on graduated scale and handwheel setting is set by locking knob.

The Tilt-Disk Sander is available with either ½ h.p., ¾ h.p., or 1 h.p. motor for most practical application from light to heavy wood or for plastic sanding or even heavy abrasive work on metals.

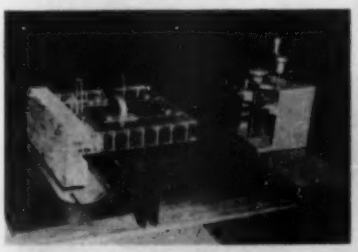
For additional information write to the manufacturer.

(For further details encircle index code 0607)

NEW SHIELD EXTENSION ACCESSORY FOR BRETT-GUARD SAW

Versatility to the visual Brett-Guard circular saw safety device has been added through the availability of a new major development — a specially designed Shield Extension Accessory (Over-Riding Fence) which can be used successfully when required for close work and many previously "unguardable" intricate operations including template cutting and tapering. Even curves and circles can be cut conveniently with the addition of this new unit.

(Continued on next page)



Brett-Guard shown with Shield Extension unit development in position for sawing operation of Dadoing or Rabbeting

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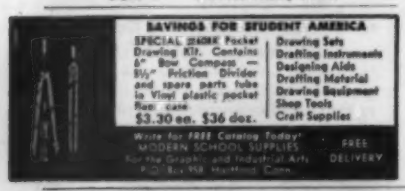
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SHOP EQUIPMENT NEWS

(Continued from previous page)

Formerly, the Brett-Guard safety shield's use has been limited for those situations where the ripping fence or the travel of the cutoff guide prevented the shield from being lowered to contact the material being sawed. After intensive safety research, the Brett-Guard organization has created this latest adaptation which insures extension of the device's tool usefulness and adding considerably to its safety value.

With the application of the Brett-Guard Safety Tool on a table-type circular saw, any sawing operation that is performed can be adequately protected without interfering with the work. The new unit now assures the saw operator complete protection in ripping or crosscutting short and even very narrow stock. The Shield Extension Accessory (Overriding Fence) may also be used in conventional ripping or cutting of wider material.

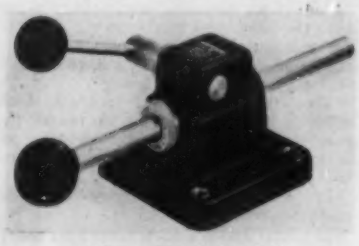
Additional information may be obtained by writing.

(For further details encircle index code 0608)

THE NEW ADJUSTO-QUICK JIG-LOK

L-W Chuck Company have recently developed the new Adjusto-Quick Jig-Lok, which simplifies jig and fixture design and eliminates special locking details.

It incorporates the same automatic pressure control used exclusively on L-W Adjusto-Quick Vises. Simple turning of the control automatically adjusts the holding pressure from 1 up to 1500 lb. Easy hand pressure locks and securely holds the rigid or nonrigid work in position without distortion. There are no screw threads to wear and no clamping and holding tools are required.



Adjusto-Quick Jig-Lok

The end of the hardened and micro-ground locking bar has been left soft one inch from the end for easy machining to add to fixtures.

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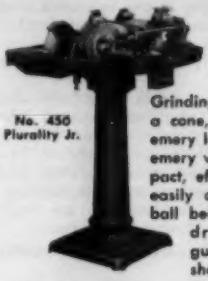
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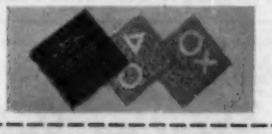

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The Jig-Lok is being offered in two models, with base dimensions 4 by 4 in., or 5 by 5 in.

Literature and prices may be had by addressing a request to L-W Chuck Company.

(For further details encircle index code 0609)

NEW KNIGHT MODEL HIGH-COMPLIANCE SPEAKER

The release of the new Knight Model KN-600HC High-Compliance 2-Way Speaker has been announced by Allied Radio Corporation. Consisting of two separate sound reproducing elements — a compression-type driver-tweeter with rectangular horn, centered in a 12-in., high-compliance woofer cone — the KN-600 HC provides peak performance in almost any enclosure.

Knight Model KN-600 HC 2-Way Speaker

The woofer cone employs ½-in. thick polyester foam construction, for an extremely high degree of rigidity. A special silicon-impregnated woven suspension provides excellent compliance and freedom from spurious resonances. A heavy, 4.6-lb. ceramic ring magnet is used for high power capacity and damping.

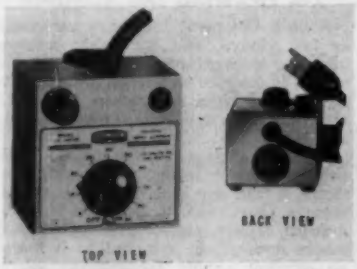
Frequency response is 25 to 18,000 cps; power handling capacity is 50 watts of program material. The KN-600HC has a free-air cone resonance of 25 cps. The speaker also includes a built-in electrical crossover, and brilliance control for adjusting treble to match room acoustics.

It is listed under Allied Stock No. 70 DU 229, and is available from Allied Radio Corporation. Please write for information.

(For further details encircle index code 0610)

TYPE 8000 THERMOLYNE CONTROLLER

Thermo Electric Mfg. Company announces a new electro-thermally-actuated stepless power input controller. By accurately switching power on and off in a pre-selected rhythm, Type 8000 Thermolyne Controller can be used to control flask



Type 8000 Thermolyne Controller

heaters, mantles, heating tapes, water baths, small furnaces, and other equipment.

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(Continued on next page)

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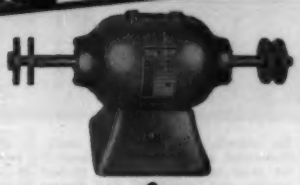

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SHOP EQUIPMENT NEWS

(Continued from previous page)

4-in. cube) is truly stepless in that the user can set any percentage of "time on" from 5 per cent to 100 per cent. A neon pilot light turns on and off as the power is cycled. This unit automatically compensates for wide variations in voltage and ambient temperature. Built-in magnetic arc suppression materially lengthens contact life and reduces sparking hazards.

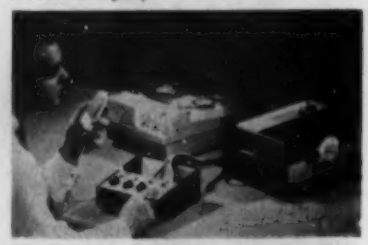
Because Type 8000 is small and will operate in any position, it can be used on the bench top, hung on lattices, set up on a shelf or any place convenient to the user.

Literature and information are available on request.

(For further details encircle index code 0611)

THE KODAK CAVALCADE PROGRAMMER

An electronic device which links most tape recorders and any Kodak Cavalcade Projector for synchronized sound-slide shows has been announced by Eastman Kodak Company.



The Kodak Cavalcade Programmer, Model 1

The Kodak Cavalcade Programmer, Model 1, permits the operator to record narration, with musical background if desired, simultaneously with inaudible "trip signals" which will automatically change slides in the projector. The narrator controls recording of the slide-trip signals with a button on the Programmer, enabling him to view the slide show and record his commentary simultaneously.

The Programmer is the central control unit when coupled to a recorder and projector. The Programmer's power cord will power both recorder and projector, cutting electrical outlet requirements at the scene of the screening to one. Cords from the Programmer attach to the tape recorder microphone and speaker jacks, and to the projector's remote control outlet.

(For further details encircle index code 0612)

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Further information available.

(For further details encircle index code 0613)

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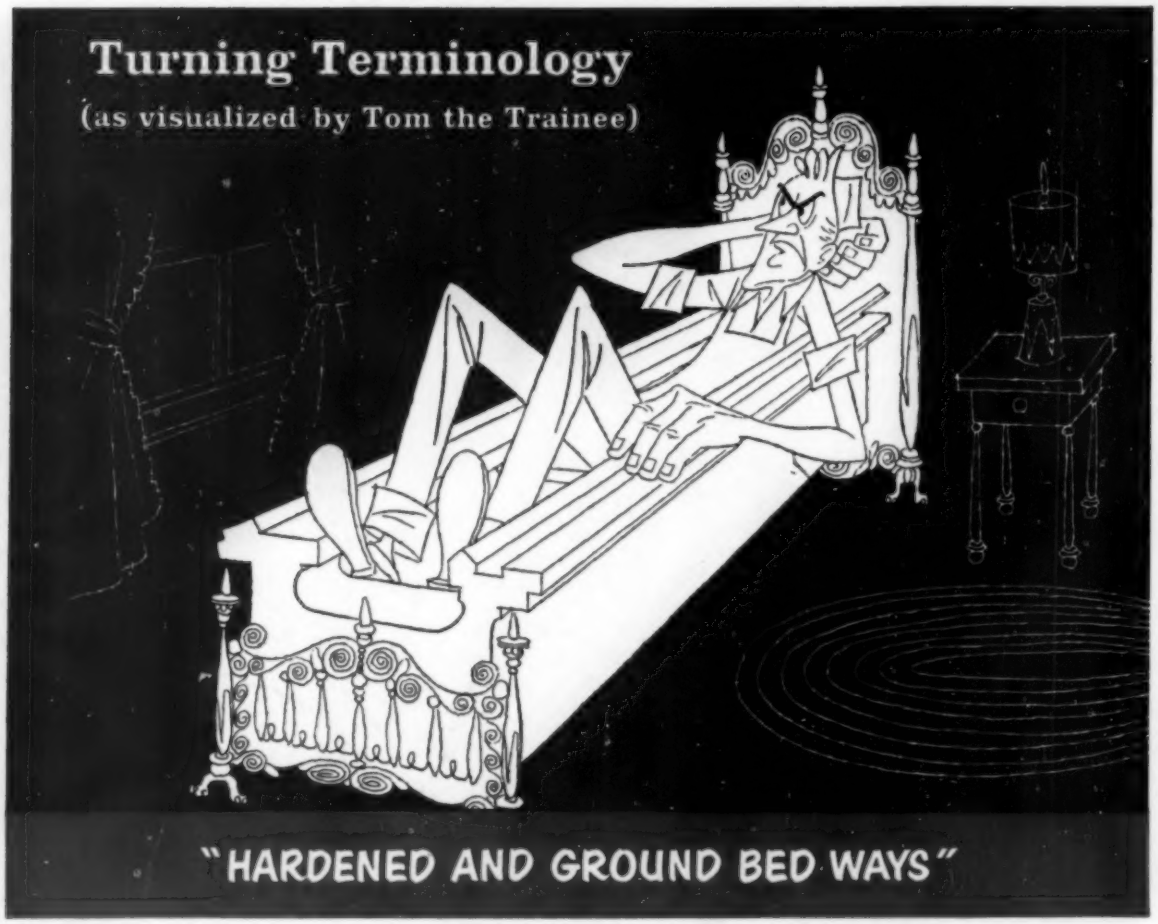

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